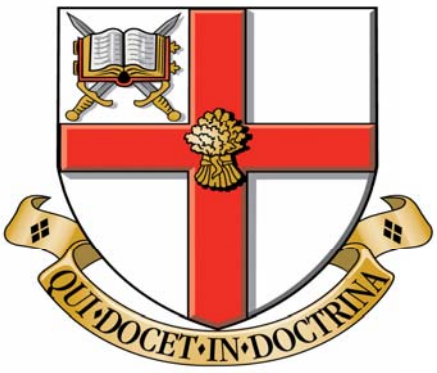

University of Chester

Department of Clinical Sciences

MSc In Weight Management

An Evaluation of the 'Measure Up' Community Weight

Management Programme

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Abstract

An evaluation of the 'Measure Up' community weight management programme

Author: Susannah Green

Purpose: The study aimed to determine if the 'Measure Up' community weight management programme, which is delivered in Knowsley, is effective in supporting participants to reduce their body weight and waist circumference.

Method: This was a repeated measures study of participants (n=42, mean BMI = 30.7kg/m^2) attending weekly weight management sessions over a 12 week period. Participants attended sessions at three different sites in Knowsley; Kirkby (n=9, mean BMI 33.3kg/m^2), Knowsley Village (n=21, mean BMI 29.4 kg/m^2) and Whiston (n=12, mean BMI 31kg/m^2). Body weight was recorded at baseline, 6 (n=26), 12 (n=35) and 24 weeks (n=9). Waist circumference was measured at baseline and 12 weeks.

Results: There were significant decreases in body weight between baseline and 6 weeks (P=0.000) of 0.95kg and between baseline and 12 weeks (P=0.001) of

3.6kg. During the 12 week course 21% of participants reduced body weight by >5% and 59% reduced body weight by 0.1-4.9%. There was no statistical difference in waist measurement during the 12 week course (P=0.452) or between weight loss at the three sites (P=0.504). Post course there was a significant difference between body weight at baseline and 24 weeks (P=0.017) of 3.6kg but no difference between 12 and 24 weeks (P=0.168).

Conclusion: 'Measure Up' is effective at supporting participants to reduce their body weight and maintain this weight reduction at 12 weeks post intervention. Participants across all three sites achieved similar results. Changes can be made to better support participants post intervention.

Declaration of Originality

This work is original and has not been previously submitted in support of a Degree, qualification or other course.

Signed:

Susannah Green

Date: 28/08/2012

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Abbreviations

BBC	British Broadcasting Corporation
CPD	Continued Professional Development
GCSE	General Certificate of Secondary Education
NHS	National Health Service

NICE	National Institute for Clinical Excellence
PARQ	Physical Activity Readiness Questionnaire
PCT	Primary Care Trust
REPS	Register of Exercise Professionals
RR	Relative Risk
SD	Standard Deviation
SIGN	Scottish Intercollegiate Guidelines Network
UK	United Kingdom
WHO	World Health Organisation

Chapter 1.

Introduction

1. Introduction

Obesity has been identified as one of the major threats to public health. The World Health Organisation (WHO) in 2000 called for urgent action to combat the growing epidemic of obesity which now affects the developing and industrialised nations alike. For this to be possible, there needs to be localised, national and international action. For the purposes of this study the focus is on a local weight management initiative in Knowsley.

1.1 Geographical Area

Knowsley is a borough of Merseyside in the North West of England with a population of approximately 151,000 people (Figure 1.1).

It is an area of high deprivation ranked as the eighth most deprived local authority in England (Appendix 7). Furthermore 46.2% of Knowsley residents live in communities within the 10% most deprived in England in terms of overall deprivation; 64% live in communities classed as being in the 10% most deprived in England in terms of health

and disability and 12,095 children are classed as living in poverty (Knowsley Public Health Intelligence Team, 2008; DoH, 2011). Long term unemployment is higher than the national average and educational attainment at GCSE level is significantly lower than the national average (DoH, 2011).

Knowsley Primary Care Trust (PCT) is the organisation which has overall responsibility for identifying health needs and commissioning relevant services to ensure that the local health system is working towards improving the health and well-being across the population (DOH, 2009). They are awarded money from Central Government to enable them to do this. Knowsley PCT is a member of the Spearhead Group of PCTs. This group comprises the bottom 20% performing PCTs in terms of the key indicators of male and female life expectancy, cancer mortality in under 75 year olds, mortality rates from circulatory disease and Index of Multiple Deprivation (DoH, 2004).

Key indicators that contribute to the Knowsley health profile (DoH, 2011) include:

- Life expectancy for both males and females is below the national average.
- The difference in life expectancy for men living in the most and least deprived areas of Knowsley is 9.1 years and 8.6 years for women.

- Early deaths from cancer, heart disease and stroke are above the national average.
- Lifestyle behaviours such as smoking, drinking and drug abuse have a higher prevalence than the national average, while the numbers of healthy eating adults and physically active adults are below the national average.

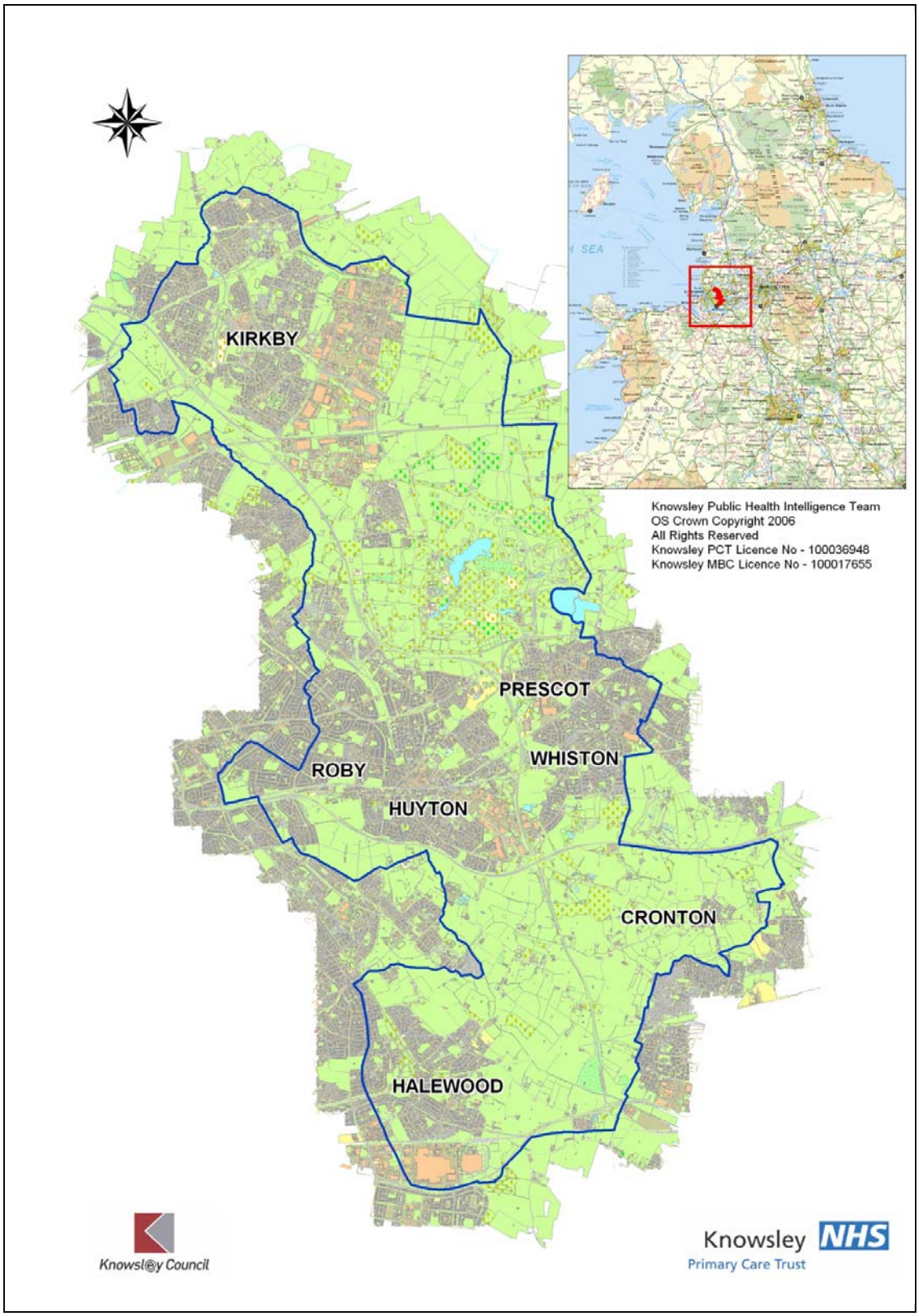

Figure 1.1 Map of Knowsley

(Knowsley Public Health Intelligence Team, 2006)

1.2 Obesity

Obesity is a physiological condition in which body fat reaches a level that adversely affects health (Neovius, Linne, Barkeling & Rossner, 2004).

The UK Chief Medical Officer has described the country's obesity problem as "a health time bomb" (Naser *et al.*, 2006); whilst the WHO (1998) has stated that public health action is urgently required to reverse the trends of increasing prevalence throughout the world.

1.3 Classification of Obesity

The most widely used term of obesity classification is the Body Mass Index (BMI) scale. BMI is an indication of the relationship between body weight and height. The relationship is defined using the following formula:

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height}^2 \text{ (m)}}$$

The WHO provided a classification scale for adult obesity based on BMI as follows:-

Table 1.1 Classification of Obesity

Classification	**BMI (kg/m^2)**
Underweight	< 18.5
Normal	18.5 – 24.9
Overweight	25.0 – 29.9
Obese Class I	30.0 – 34.9
Obese Class II	35.0 – 39.9
Obese Class III	□ 40.0

(WHO, 2000)

The National Institute for Clinical Excellence (NICE), which influences practice across the National Health Service (NHS), advises the addition of a waist circumference measurement for adults with a BMI less than 35kg/m^2 as BMI is not a direct measure of adiposity (NICE, 2006). There is increasing evidence to suggest that waist to hip ratio or waist to height measure is more accurate in terms of predicting cardiovascular risk than BMI (Ashwell, Gunn & Gibson, 2012; Schneider, Klotsche, Silber, Stalla & Wittchen, 2011).

NICE advises that waist circumference should not be used as an obesity indicator without BMI, although BMI can be used without waist circumference. Ideally both measures should be used to assess risk of further health complications (NICE, 2006). The level of risk indicates the level of intervention that should be provided for the individual (Table 1.2).

Table 1.2 Risk Associated With BMI and Waist Circumference

BMI **Classification**	**Waist Circumference**		
	Low	**High**	**Very High**
Overweight	No Increased Risk	Increased Risk	High Risk
Obese Class I	Increased Risk	High Risk	Very High Risk
For men, waist circumference of less than 94cm is low, 94-102cm is high and more than 102cm is very high. For women, waist circumference of less than 80cm is low, 80-88cm is high and more than 88cm is very high.			

(NICE, 2006)

1.4 Health Implications of Obesity

It is not obesity that causes ill health but rather the health complications associated with it. These were summarised by Kopelman (2007):

- In cases occurring in individuals with a Body Mass Index (BMI) greater than 25 kg/m^2 For every unit change in BMI there is a 3.6 fold increased risk of coronary artery disease.
- Around 10% of all cancers in non-smokers are related to obesity.
- Individuals who are overweight or obese and have hypertension, have an increased risk of ischemic stroke; 90% of type 2 diabetics have a BMI greater than 23 kg/m^2.

These complications were further summarised in 2004 by the House of Commons Health Select Committee Report:-

Table 1.3 Health Risks Associated with Obesity

Greatly Increased Risk (RR>3)	Slightly Increased Risk (RR1-2)
Type II diabetes	CVD

Insulin Resistance	Hypertension
Gallbladder Disease	Stroke
Dyslipidaemia	Osteoarthritis
Breathlessness	Hyperuricaemia and Gout
Sleep Apnoea	Psychological Ill Health

RR= Relative Risk WHO, (1998)

Prevalence of limiting longstanding illness is higher in obese individuals compared to the general population. Limiting longstanding illness is reported in 28% of obese men and 33% of obese women compared to 16% and 15% of normal weight in men and women respectively (The Information Centre for Health and Social Care, 2012). In addition to affecting quality of life, health complications associated with obesity can cause premature death. Research has shown that adult obesity causes a reduced life expectancy of 8-10 years predominantly through diabetes, cancer, cardiovascular disease and liver disease (Kopelman, 2007).

Life expectancy in Knowsley is below the national average. Females born in Knowsley have a life expectancy of 79.2 years, compared to the national average of 81.8 years. Males born in Knowsley are expected to live to 74.8 years, compared to the national average of 77.7 years (Knowsley Public Health Intelligence Team, 2009). The main causes of death for both males and females in Knowsley are cardiovascular disease, causing 33.2% and 30.2% respectively, and cancer which causes 30.9% males and 27.8% female of deaths (Knowsley Public Health Intelligence Team, 2010).

1.5 Prevalence of Obesity

The prevalence of obesity in the UK has more than doubled in the last 25 years (Morgan & Dent, 2010). This upward trend is showing no sign of reversing and it is predicted that by 2050 60% men and 50% women will be obese (Foresight, 2007). The Information Centre for Health and Social Care (2012) compiled findings from a number of epidemiological studies including the Health Survey for England to report national prevalence for 2010. They reported that:

- 26% of both men and women were obese.
- 42% men and 32% women were obese.

- 34% men and 46% women had a raised waist circumference.

When combining the data of BMI and waist circumference to assess risk of health complications, 22% of men were at increased risk, 12% high risk and 23% very high risk. For women, 14% were at increased risk, 19% high risk and 25% very high risk.

The findings from the 2009 Health Survey of England revealed that the prevalence of obesity rates in Spearhead PCTS, including Knowsley PCT, are higher than those found in non-Spearhead PCTs with the association more apparent in women than men (DoH, 2010). It is unclear if this trend is reflected in Knowsley's obesity rates as the last recorded data was measured in 2006 and reported in 2007, although there was an upward trend from 2001-2006. The Knowsley data is from the Knowsley Adult Health and Lifestyles Survey in which participants self report height and weight. This can lead to underreporting of weight, skewing results and therefore prevents an inaccurate comparison to the Health Survey for England, in which participants are measured by researchers.

The prevalence of obese adults in Knowsley is 20% varying across the six Area Partnership Boards from 15.7% to 24.6%. The highest prevalence is seen in the three

Area Partnership Boards that are the most deprived (Knowsley Public Health Intelligence Team, 2010). It is likely that the Knowsley obesity prevalence of 20% is underreported and as it had followed an upward trend mirroring the national increase in obesity it is likely to be higher than the reported 20%.

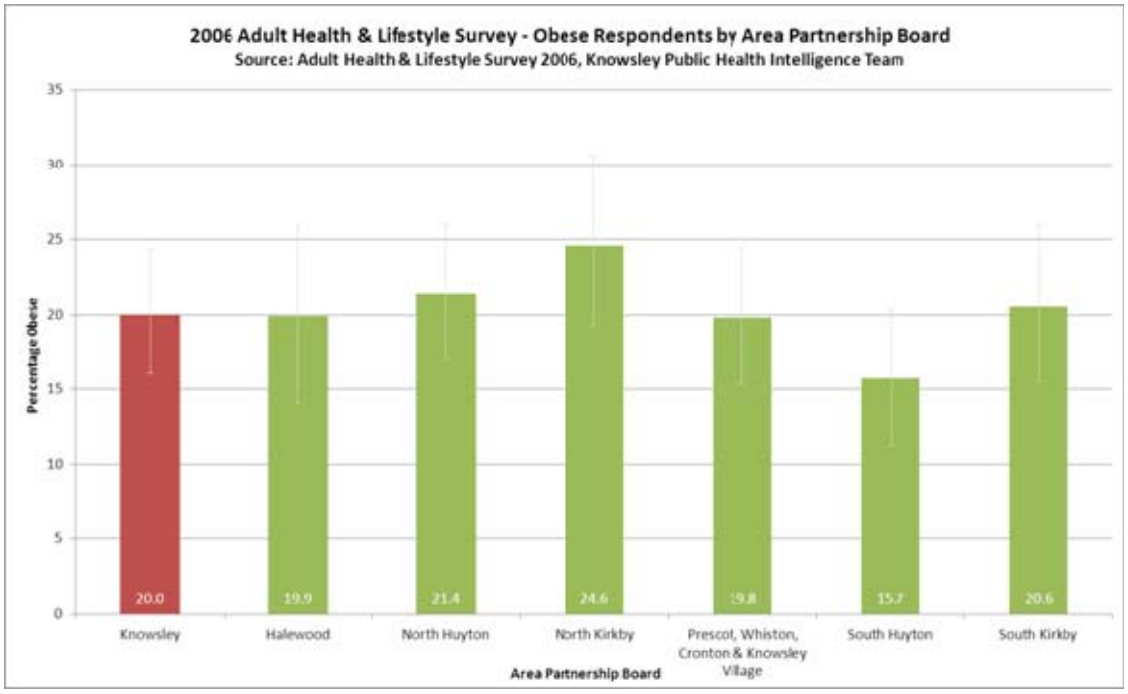

Figure 1.2 Prevalence of Obesity in Knowsley by Area Partnership Board

(Knowsley Public Health Intelligence Team, 2010)

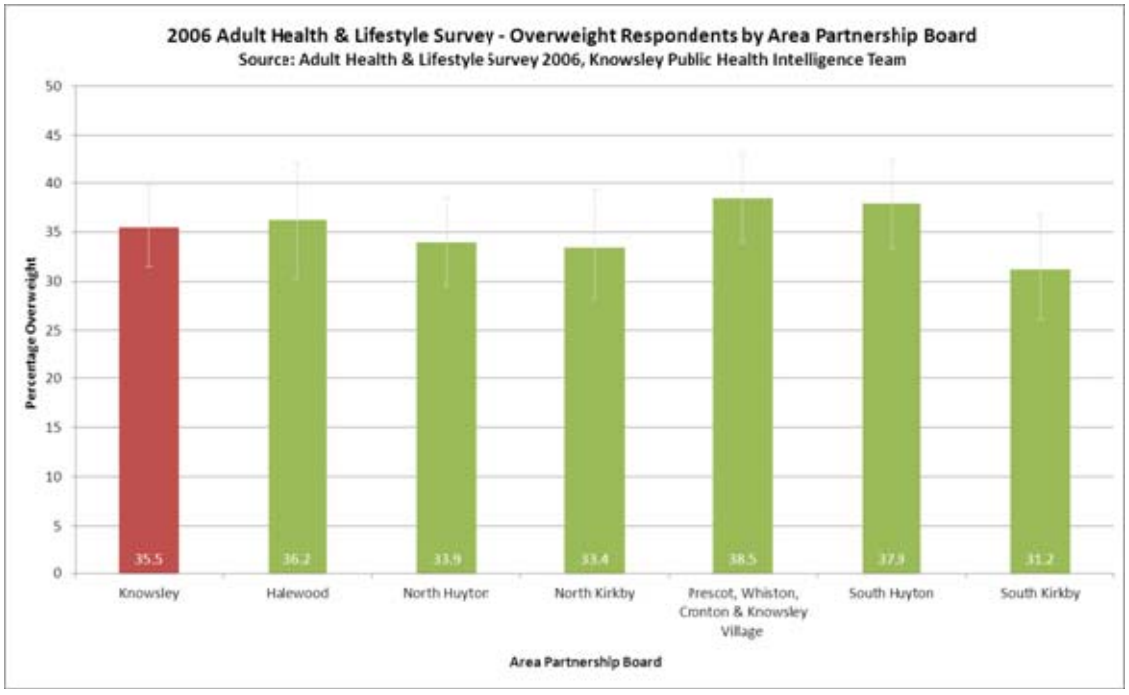

Figure 1.3 Prevalence of Overweight in Knowsley by Area Partnership Board

(Knowsley Public Health Intelligence Team, 2010)

1.6 Cost Implications of Obesity

The Foresight Report (2007) predicted that the cost of obesity to society will reach £50 million by 2050. The National Audit Office in 2001 estimated that costs to the wider economy already exceeded that figure. It attributed 18 million days of sickness absence and 30,000 premature deaths in 1998 to obesity. It estimated that the wider cost to the economy in terms of lower productivity and lost output could be as much as £2billion per year. The discrepancy between the figures provided by the different

reports could be because obesity is often a contributing factor to the development of a disease and it can be difficult to determine one factor as the definite cause.

In terms of direct costs to the NHS it is estimated that during 2006-07, £5billion was spent on obesity related ill health. Two major contributing factors to obesity are poor diet and inactivity which had estimated costs to the NHS of £5.8 billion and £0.9 billion respectively in 2006-07 (Scarborough *et al.,* 2011). A proportion of the cost to the NHS is spent on administration of drugs prescribed for the treatment of obesity. In 2006, 1.06 million prescriptions were administered at a cost of £47.54million, this rose to 1.23 million prescriptions at a cost of £51.58million in 2007 (The Information Centre for Health and Social Care, 2012).

1.7 Benefits of Weight Loss

Marked increases in health status, namely by reducing cardiovascular and metabolic risk, can be achieved by a fairly modest reduction of 5-10% body weight in individuals with a BMI of 25-35kg/m^2. A more substantial weight reduction of 15-20% of body weight is required in individuals with a BMI greater than 35kg/m^2 to reduce the co-morbidities that are more prevalent in this group (SIGN, 2010).

1.8 Strategies for Tackling Obesity

Due to the financial and health implications that obesity places on a population it is imperative that services are provided to support individuals to prevent and manage overweight and obesity.

The National Institute of Health (1998) set out guidelines to determine the focus weight management initiatives.

"The predominant aims of weight management programmes are:

1. At minimum, to prevent further weight gain.
2. Reduce body weight.
3. Maintain lower body weight over the long term."

Similar guidance was issued in 1996 by the Scottish Intercollegiate Guidance Network for the aims of weight management programmes

1. Primary prevention of excess weight gain.

2. Weight loss (usually completed within three to six months).

3. Prevention of weight regain (from three to six months onwards).

4. Optimising health and reducing risk of disease (whether or not weight loss is achieved).

NICE guidance for obesity were published in 2006 to influence and ultimately improve NHS services provided for overweight and obese individuals, making them more effective and reverse trends of increasing obesity prevalence. NICE guidance outlines eight characteristics of a community weight management programme which would be deemed best practice. These characteristics include the focus of a multi-factoral programme (including emphasis on diet, physical activity and behaviour techniques) on long term lifestyle change to support and maintain weight loss of 0.5-1kg per week.

Obesity was identified as a key area for concern in Knowsley in 2004. A joint strategy between Knowsley PCT and Knowsley Metropolitan Borough Council, "Energise Knowsley – Obesity Strategy" was introduced. This strategy has since evolved into Energise Knowsley 2009-2012 Healthy Weight Strategy (Appendix 8). The strategy is a multi-disciplinary approach to delivering population based interventions at a

universal level, as well as support and treatment options for overweight or obese individuals.

1.9 Knowsley Community Health Development Team

The introduction of the Community Health Development team by Knowsley PCT in 2003 was designed to provide local initiatives which could be delivered 'to local people by local people'. Therefore, building capacity to improve health and wellbeing in some of the countries most deprived communities. As the Community Health Development Team consists of para-professionals as opposed to Allied Health professionals there are no clinical duties to perform and the focus is on working with the local community to deliver health interventions.

This approach provides a cheaper alternative to more expensive clinical teams with a focus on universal health interventions aimed at disease prevention. This in turn enables clinical teams to focus on more complex medical interventions. The provision of a Community Health Development Team within the local health service allows a continued link between the community and clinical teams with referral pathways

operating up and down the clinical pathway benefiting both the health services and the local community.

One such initiative developed by the team is the 'Measure Up' Community Weight Management Programme. This was initially developed to provide a weight management service for individuals who were overweight but did not have a BMI high enough to enter into clinical services.

1.10 'Measure Up' Weight Management Programme

'Measure Up' is a community weight management programme run by NHS Knowsley's Community Health Development Team. Participants can be referred by other agencies or can self refer into the programme (Appendix 6). Participants must have a BMI of 25-35 kg/m^2. Anybody with BMI less than 25kg/m^2 is offered a healthy lifestyle course while those with a BMI higher than 35kg/m^2 are offered a referral to Changes Weight Management, a dietician led service.

'Measure Up' is a 12 week programme consisting of 13 weekly two hour sessions. Each session includes an option to be weighed, an education session and a practical physical activity session. Waist measurements and self esteem levels are measured at the start and end of the programme as well as at a three month follow up session.

Education sessions include:-

- Diet
    - Balanced diet based on the Eatwell Plate
    - Food labelling
    - Eating out
    - Reducing fat intake
    - Reducing sugar intake
    - Healthy recipe ideas
- Physical Activity
    - Adopting an active lifestyle
    - Understanding physical activity recommendations for weight loss
    - Increasing physical activity levels
- Behavioural component

    - Goal setting
    - Coping with triggers and cravings
    - Changing supermarket shopping habits
- Body image
- Alcohol
- Patterns of weight loss

Participants are provided with pedometers, pedometer recording sheets and food diaries to self monitor food intake and physical activity levels throughout the programme.

The aim of 'Measure Up' is to support participants to reduce their weight by 10% and sustain this reduction in weight.

Chapter 2.

Literature Review

2. Literature Review

There is no suggestion that this is an exhaustive literature review, rather its aim is to convey the extent and content of information and ideas available on weight management initiatives. The areas of literature reviewed are chosen to reflect the options available for the support of overweight and obese individuals. These areas are commercial weight management programmes, weight management programmes in primary care and weight management programmes utilising technology of internet and mobile phones.

Self help dietary plans e.g. dietary regimes provided in books and meal replacement plans were excluded as these do not comprise a support component and are therefore fundamentally different to the 'Measure Up' programme being evaluated in this study. Treatment options for morbidly obese patients were also excluded.

Literature searches were undertaken using the databases CINAHL, MEDLINE and AMED. Key search terms included obesity, overweight, weight management, commercial weight management, weight loss, technology and primary care

2.1 Weight Management Programmes Utilising Technology

Many weight management programmes are utilising developments in technology and higher incidence of internet usage at home to enhance delivery. This usage reflects trends in other areas of society where phones and internet are increasingly utilised for activities such as shopping.

Face to face programmes can be expensive, particularly when including multi-disciplinary components with specialist staff utilised to deliver components of nutrition, physical activity and psychology. For a weight management intervention to be commissioned by the NHS, it is important that it provides both quality and value for money (DoH, 2008).

Table 2.1 Summary of Weight Management Interventions Utilising Technology

Study	Sample	Methods	Key Findings
Chambliss, Huber, Finley, Scott, McDoniel, Kitzman-Ulrich & Wilkinson (2011)	120 – mean BMI 30.5 kg/m^2 Assigned to one of two experimental groups or control groups	Randomised Control Trial Experimental group 1 received email feedback on energy balance, physical activity levels, dietary composition and eating patterns based on information inputted by the participant using internet based software or control group. Experimental group 2 received a behaviour component including behaviour skills, monthly newsletters and step counters.	There was significantly more weight loss and reduction in waist circumference in both the experimental groups compared to the control group but no significant differences between the control groups. After 12 weeks Experimental group 1 reduced body weight by 2.7kg, group 2 by 2.5kg and the control group increased weight by 0.3kg.
Collins, Morgan, Warren, Lubans & Callister, (2010)	University staff or students all male. N=65	Randomised Control Trial The experimental group inputted food intake and activity levels into computer package and were provided with individual feedback from staff.	Both groups reported reducing their total calorie intake at three months and six months. Experimental group reduced calorie intake by significantly more at three and six

		The control group self monitored their diet and physical activity levels without the use of computer packages or staff input.	months. There was a six month reduction of 5.3kg in the experimental group compared to 3.5 kg in the control group. Both groups experienced weight loss - experimental group had more weight loss than the control. The weight loss exceeded what was expected based on the sustained calorie reduction over six months.

Study	Sample	Methods	Key Findings
Stewart *et al*. 2011	U.S Soldiers exceeding acceptable army weight range and civilians on army base	Diet and activity levels were inputted into the internet computer programme and an analysis was provided allowing participants to self regulate weight, energy intake and expenditure.	Within the 25 month trial 12% of participants lost 5% or more of their body weight but there was no significant difference in the weight loss of the army and civilian groups.
Haapala, Barengo, Bigs, Surakka, Manninen (2009)	156 participants including 36 males. 125 met eligibility criteria. Aged between 25 and 44 years with a BMI between 25 and 36 kg/m^2, no co-morbidities. Participants responded to advertisements in newspapers.	Participants were assigned to a control group (n=63) or experimental group. The experimental group were sent text messages to encourage them to monitor food intake, increase activity levels and report their body weight. They were also set weight loss targets via the text messaging programme.	In the experimental group, 56 completed three months, 45 completed 12 months compared to 40 completers in the control group at six months. Most of the weight loss in the control group occurred in the first three months (4.5kg). This increased to 5.2kg after six months before participants gained some weight taking them to 4.5kg at 12 months. The control group did not lose a statistically significant level of body weight at 12 months (1.1kg) although weight loss did occur.

			24% of the control group lost 5% of their body weight at 12 months compared to 10% of the control group. Mean waist circumference reduction in the experimental group at 12 months was 4.5cm, compared to 1.6cm in the experimental group.
Study	**Sample**	**Methods**	**Key Findings**
Donaldson (2010)	17 participants including 7 males who had completed a dietetic led 12 week weight loss group.	Participants were sent twice weekly text messages asking questions based on self monitoring targets they had been set. Participants had body mass, waist circumference, BMI and quality of life measure recorded on completion of weight loss group and after 12 weeks of text message intervention. Results were compared to standard care control group.	Participants receiving text messages reduced their body weight by an average 1.6kg and their waist circumference by 2.2cm. The control group increased their body mass by 0.7kg and their waist circumference by 1.5cm

The study participants monitored by Chambliss and colleagues (2011) and Haapala *et al*. (2010) included those who self referred, suggesting a high level of self motivation. Participants had identified that they were overweight or obese and were ready to make lifestyle changes. The differences in weight loss between the control and experimental groups suggest that the programme was successful and whilst motivated, the participants in the control group lacked skills to be able to change their lifestyle. Both studies relied on participants having access to email, internet or sophisticated mobile phones suggesting that the participants would have a high level of literacy. Internet usage is becoming more accessible to the population as a whole; however it positively correlates with socioeconomic status, which in turn correlates with literacy levels, suggesting the study participants are not an accurate reflection of society (Blackburn, Read & Hughes, 2005).

Usage of both IT equipment and mobile phones negatively correlate with age. There is a greater negative correlation of smart phone usage with age than IT usage, particularly using smart phones to their full potential based on applications available.

There was no indication provided by Collins *et al.* (2010) as to how the participants were recruited or allocated to groups. As the study was based in a university utilising staff and students, the likelihood of the socioeconomic status and education levels being higher than the national mean are great. Whilst there may be staff at university who are not educated to degree level in some non-academic roles, the reliance on participants being able to familiarise themselves with and use a computer package that analyses diet and energy expenditure implies that a relatively high level of education will be seen across the cohort.

The control group had a more arduous reporting technique in comparison to the study group, completing paper diaries as opposed to computer analysis. The ease of the computer completed analysis may have led to more accurate reporting in an area which is renowned for being susceptible to underreporting (food diaries) and over-reporting (physical activity diaries).

The comparison of army and civilian groups by Stewart *et al.* (2011) does not offer a beneficial comparison as the groups have such different motivations, backgrounds and demographics. The army group had been instructed to lose weight, with potential job loss the consequence of not doing so, in comparison to

the civilian group who had identified themselves as being overweight or obese and had opted to lose weight. The army cohort is at risk of losing their jobs if they do not meet the specified weight requirements and this provides greater motivation for weight loss than a civilian. They are also from a highly structured and disciplined background which may help compliance. It was also noted by the researcher that the culture within the base for those people who had been instructed to lose weight was to do so – failing to lose weight was met with ridicule from colleagues increasing the incentive to lose weight. The army group was predominantly male, whilst the civilian group was predominantly female. The differing motivations between the groups poses the question – is weight loss more effective when there are immediate consequences such as job loss as opposed to long term consequences such as obesity related health problems?

A more useful comparison between study groups may have been provided by a control group of soldiers trying to lose weight independently. This would have better tested the hypothesis that it is the internet weight management intervention that facilitates weight loss.

The frequency of measurements in the mobile phone study (Haapala *et al.*, 2009) provides an insight into the pattern of weight loss experienced by the experimental group. A relatively fast rate of weight loss was observed in the first three months, which slowed between three and six months, before participants gained weight between six and twelve months. Without the six month measurement it would appear that participants lost weight up to three months before maintaining the weight loss until twelve months, suggesting a successful weight management initiative. The trajectory of weight gain between six and 12 months could continue further, nullifying the effects of the intervention. However, this could only be determined by a further follow up appointment.

The phase after a group based weight management intervention often sees participants experience a weight gain, as was the case with the standard care control group in the research by Donaldson (2010). Participants receiving the interactive text messaging however, continued to lose weight. This emphasises the importance of an effective exit strategy for participants completing a time limited weight management group. The experimental cohort at 17 was a small sample size but offers an insight into the complimentary role that technology can provide to a weight management intervention, particularly in the health service

2.2 Commercial Weight Management

The increasing prevalence of obesity positively correlates with the growth of the commercial weight management industry, particularly as the health risks of obesity are more publicised. Obesity, unlike any other public health prevention topic, is associated with a high level of media interest and coverage (King, Gill, Allender & Swinburn, 2010). The magazine sector of the media tends to focus on body image over health complications in relation to obesity. This could contribute to people's motivation to lose weight. 44% of surveyed Slimming World participants stated that their reason for weight loss was to look better in clothes (Pallister, Avery, Stubbs & Lavin, 2009).

Table 2.2 Summary of Commercial Weight Management Studies

Study	Sample	Methods	Key Findings
Pallister, Avery, Stubbs & Lavin (2009)	23,914 Slimming World participants	Surveys distributed to members.	Motivation to lose weight; • 46% wanted to improve health. • 44% wanted to look better in clothes. • 22% wanted to improve energy and fitness levels.
Truby *et al.* (2006)		Randomised control trial comparing Weight Watchers Pure Points Programme; Rosemary Conley Eat Yourself Slim diet and fitness plan; Dr Atkins New Diet revolution and a control group.	Similar level of weight loss across all weight loss plans after six months. Statistically significant difference between weight loss of the control group and all four plans. Attrition rate across the cohort 28% after six months. Weight Watchers and Rosemary Conley had twice as many participants at the end of the study as Atkins and Slim Fast.

Jolly *et al.* (2010)	740	Participants referred from primary care to Weight Watchers, Rosemary Conley or Slimming World, dietetic group, GP based one to one counselling, pharmacy one to one counselling or control group of leisure centre access. Vouchers used so as not to affect treatment of participant by group leader.	Weight Watchers participants lost a mean 5.15kg and 4.43kg at 12 weeks and one year respectively. Slimming World participants lost 4.25kg and 3.27kg at 12 weeks and one year. Rosemary Conley participants lost 5.29kg and 3.27kg at 12weeks and one year. Size Down 3.22kg and 2.37kg GP 2.17kg and 1.13kg, Pharmacy 2.80kg and 2.14kg Leisure Centre 2.96kg and 1.87kg.
Study	**Sample**	**Methods**	**Key Findings**
Ahern, Olson, Aston & Jebb . (2011)	29, 326 Weight Watchers Primary Care referrals. 90% female sample.	Retrospective study based on participants who were provided vouchers for attendance from primary care.	54% attended all 12 sessions. 33% lost □5% body weight.

Jebb *et al.* (2011)	377 primary care referrals to Weight Watchers. Three countries included: Australia, UK and Germany BMI 27-35kg/m^2	Compared attrition rates by country and looked for clinically significant 5% weight loss in participants who had been given twelve months free access to Weight Watchers. Compared to standard care groups.	230 completers. UK 64% attrition rate. Australia 41% attrition rate. Germany 25% attrition rate. 60% of WW completers achieved 5% reduction in body weight at one year. 25% of standard care participants lost 5% body weight.
Bye, Avery & Lavin (2005)	125 men accessing male only Slimming World group.	Retrospective study based on past progress of existing Slimming World members.	Mean body weight loss after 12weeks was 9.2%. 91% lost □ 5% body weight. Mean weight loss at week 24 was 11.4%.

Study	Sample	Methods	Key Findings
Lavin *et al.* (2006)	91 participants (80 female, 11 male) recruited from a suburban and inner city Derbyshire GP practice. Mean BMI 36kg/m^2	Participants provided with Slimming World vouchers for twelve weeks and given the option of self funding for a further twelve weeks.	62 participants completed 12weeks (attrition rate 32%). 34 participants completed 24 weeks (attrition rate17%) (self funders more likely to come from suburban practice therefore higher SES and have achieved 5% weight loss). Mean weight loss after 12 weeks 5.4kg and 11kg after 24 weeks 57% 12 week completers lost at least 5% body weight. 60% week 24 completers lost at least 10%.

There are three main commercial weight management programmes operating in the UK; Rosemary Conley, Weight Watchers and Slimming World. Despite the fact that Rosemary Conley is the only one of the three programmes to offer an exercise component and operates approximately 200 weekly classes for 80,000 members (www.rosemaryconley.com, 2011), it is the only one of the three that has not published evidence of the effectiveness of its programme. This is reflective of the lack of robust evidence base for both commercial and primary care weight management programmes in the UK (Jolly *et al*. 2010).

Despite the Rosemary Conley programme not publishing its own findings, it was included in the study by Truby and colleagues (2010) and produced weight loss results on a par with its competitors. The completion rates of participants in Weight Watchers and Rosemary Conley exceeded those of Slim-Fast and Atkins, which may be due to the support provided by the group environment.

One of the most important factors in successful weight loss is motivation to persevere with the programme. This motivation could have been increased by the

trial being filmed for the BBC. Although participants were aware that the likelihood was that they would not appear on television and this factor would not have affected comparisons between different interventions in this study, it cannot be discounted when considering the success of the programmes compared to other commercial and primary care initiatives.

A similar study was conducted by Jolly and colleagues (2011) comparing the success of primary care referral to NHS and commercial groups. As this study was conducted without television it may be more representative of motivation to lose weight. Participants completing the programmes achieved similar levels of weight loss. However commercial programme participants lost more weight than those in primary care and all lost more than the control, with the exception of one to one counselling provided in GP and pharmacy settings. Participants were followed up after one year although it is unclear whether or not participants continued on the programme independently of the study between the end of the 12 week voucher provision and the one year follow up appointment.

There are now several incidences in the UK of primary care referring patients into commercial weight management programmes, funded through PCT obesity

budgets. These are most commonly Weight Watchers and Slimming World. Both organisations have conducted research to investigate the success of cohorts referred from primary care. The study by Ahern and colleagues (2011) provided participants with vouchers to attend 12 Weight Watchers sessions. These vouchers could be utilised in consecutive weeks or over a longer period of time. As such the final weight and therefore weight loss is not monitored over a set time scale.

The cohort was a combination of repeat referrals and first time referrals. Repeat referrals were issued vouchers concurrently and therefore, attended Weight Watchers over a longer duration. Weight loss is likely to be lower in the repeat referrals, as weight loss rate slows with time. Often members of weight loss clubs enter a cycle of weight gain and loss resulting in continued membership of various weight loss programmes. There was no long term data for the success of participants in terms of weight maintenance or further weight loss. This information would enhance the evidence base of the success of commercial weight management programmes.

The majority of the participants (90%) were female, emphasising the need to find a suitable treatment option that is effective for men and that they are comfortable

participating in. Slimming clubs and weight management courses tend to have predominantly female participants. Men are less likely to recognise themselves as overweight or obese and less likely to undertake action to reduce weight (Lemon *et al.* 2009). Slimming World offer male only slimming groups and review the progress of men accessing them. No information regarding attrition rates was provided as this was a retrospective study based on existing Slimming World members. Therefore, only participants who were still attending Slimming World at the time of the study and not those that had left the programme were included, which suggests that the cohort may be comprised of motivated men who have the attitude to succeed on any programme.

The multi-country study of Weight Watchers participants compared commercial weight management to standard primary care. Patients in the standard care group were offered advice from GPs rather than the dietetic led weight management services offered by many PCTs in the UK. The likelihood is that GP sessions over the 12 month study period were less intensive and frequent to the Weight Watchers sessions. There is a possibility that any progress of the Weight Watchers group may have been as a result of the increased frequency of appointments rather than quality of intervention. This time intensive intervention is cost effective when

delivered in a group environment such as Weight Watchers but not in a GP environment. A third control group of weekly weigh-in sessions without any advice would highlight if it is the advice given or frequency of contact that has the most impact.

The prevalence of obesity in the UK is at such a level that, unlike with other health problems, primary care has to consider working in partnership with commercial providers in order to offer treatment options to all that need it. By allocating low risk cases i.e. those who do not present with co-morbidities to a commercial weight management provider, space is available in specialist services for people who need additional treatment. It is important to acknowledge that a one size fits all treatment option is not suitable and there is an opportunity for primary care and private sector to work together to offer large scale interventions.

This partnership opens the weight management industry to lesser qualified individuals, groups and companies marketing services at people who may be emotionally vulnerable and desperate for a solution to a problem which is generally several years in development (Riddell, 2006). The studies discussed have illustrated clinically significant weight loss in their clients. It is telling that mean

weight loss is not provided for all samples with some studies preferring to highlight the percentage achieving clinically significant weight loss. This method can potentially cover the fact that the total cohort has a low mean weight loss and highlights the success of the minority.

The commercial weight management sector can bind participants in implied contracts for set periods of time, meaning participants must continue to pay even if motivation has decreased, circumstances have changed meaning they can't attend or they aren't getting the results that were advertised by the programme. This approach may be seen as unethical for vulnerable groups attending slimming clubs.

The majority of the studies discussed with the exception of the evaluation of Slimming Worlds men's group provide access to the weight loss programmes at no expense to the participant. Attrition rates were low at 17% when participants from Lavin and colleagues (2006) study were self funding, although only 41 out of the original 91 chose to self fund for 12 weeks. The participants who self funded had already had a level of success in the initial 12 weeks so may reflect the more motivated participant rather than the overweight or obese population as a whole. As such it is unclear if there is a different rate of weight loss or attrition rates with

paying members compared to those referred into the schemes by primary care or researchers.

In response to the potential for participants, particularly vulnerable groups to be exploited, Australia has established a code of practice which is monitored by a national independent council. It monitors voluntary members which can include independent and national weight management providers to ensure that consumers receive, amongst other things, safe and effective weight management products and services which are nutritionally sound.

Members are further advised that exclusion criteria are applied to potential clients on the grounds of safety related to existing medical conditions etc as priority over financial gain for the organisation (Riddell, 2006). Whilst Australia should be commended for the proactive approach to regulation it should be noted that application of the code, while recommended and considered best practice is voluntary. A similar model is that of the UK Register of Exercise Professionals (REPS). Qualified instructors are advised to register with REPS and to maintain membership they must embark on continued professional development (CPD). Members of the public can check the register to ensure that their exercise

instructor is fully qualified. This does not prevent unqualified instructors or those that have not undertaken CPD from setting up an exercise class or imparting weight management advice and charging participants to take part. It is likely that the majority of clients accessing fitness classes, who do not work in the industry are unaware of REPS and more likely to attend a class based on a recommendation from a peer or convenience.

Weight Management within the NHS in the UK is governed by guidelines from the NICE. Guidance for primary care providers advises that they should discuss all treatment options meeting best practice guidelines, including commercial providers (Ahern *et al.,* 2011). This approach may suit patients who do not want their weight status to be medicalised and therefore would not participate in a primary care programme. It is also socially acceptable for women in particular to attend commercial weight management programmes, with groups of friends often attending together as a ready made support network–a practice that is not observed in any other health treatment.

2.3 Weight Management Programmes in Primary Care

Despite obesity being a major cause of illness and ill health in the UK and therefore a priority for the NHS with estimated spending of £5.8billion per year, there is not an adequate evidence base of evaluated weight management programmes delivered in a primary care setting. One cannot assume from this lack of evidence that weight management programmes are not offered by the NHS or that programmes are not evidence based or evaluated, just that the findings are not routinely published in academic literature to share best practice with colleagues. Primary care organisations are required under the National Service Framework for diabetes and coronary heart disease to develop and manage obese patients (DOH, 2000, 2001). Evidence must be provided annually by primary care to show compliance with National Service Frameworks.

Table 2.3 Summary of Weight Management Initiatives in Primary Care

Study	Sample	Methods	Key Findings
Gaynor, Hanna and Green (2009)	123 participants. 73 eligible for analysis.	Retrospective study examining health related outcomes of body weight, BMI, heart rate, blood pressure and percentage body fat. Participants attended education day and three-monthly follow up appointments.	Participants were eligible for analysis if they had attended a follow up appointment. At three months 14% had lost □5% body weight, 48% lost 0-4.9% body weight and 38% gained weight. Mean weight loss at six months (n=50) 4.5kg and at 9months (n=31) 4.6kg.

Read, Ramwell, Storer and Webber (2004)	216 participants 160 female, 56 male, BMI > 30kg/m^2, aged 18-65. Participants were targeted by letter and opted into programme.	Seven two hour education sessions over 14 weeks. Follow up appointments at 4, 6, 9 and 12 months.	Early weight loss was a predictor for future weight loss. 40% did not complete 14 week intensive sessions. 65% did not complete 12 months. 4% of patients starting programme lost 10% body weight, 13% lost 5-10%. Course completers lost mean 2.9% at three months which was maintained at 12 months. Average weight loss at three months was 4.1kg for course completers compared to 1.7kg for participants that dropped out at this phase.

The two studies had different approaches to intervention delivery. Gaynor and colleagues (2009) delivered an intensive day long education session with follow up appointments, compared to Read *et al*. (2004) who delivered regular education sessions over a 14 week period with follow up appointments. Both approaches seemed to yield high attrition rates with 65% of participants lost to follow up from Read and colleagues, compared to a final analysis of 31 participants from 73 starters for Gaynor and colleagues. A direct comparison of attrition rates cannot be made as the study designs differ. Gaynor and colleagues could potentially have participants in their programmes who have not reached the nine month stage and therefore are not included in analysis, as start times in the study were not the same for all participants.

The two studies provide measurements at different time stages and use different parameters. Gaynor and colleagues report percentage of participants losing weight at three months with 14% losing greater than 5% body weight. Weight loss appeared to remain at this level until the end of the study with no increased losses at six or nine months. 13% of course starters lost 5-10% body weight at the end of

the study by Read and colleagues. Attrition rates for Read and colleagues appeared to be linked to early weight loss with lack of perceived results perhaps affecting motivation of participants.

The majority of research into weight management programmes in primary care focuses on attitudes towards and perceptions of weight management programmes. The Counterweight programme is one of the most robustly evaluated but evaluation is in terms of how successful it is in supporting staff, usually practice nurses to raise the issue of obesity rather than effectiveness of the intervention in terms of reducing weight (The Counterweight Team, 2004).

Counterweight evaluations found that primary care staff were more likely to provide nutritional information to patients, despite nutritional knowledge that was not necessarily robust. The study questions were weighted towards nutritional rather than physical activity advice imparted. This suggests an emphasis on energy intake rather than energy expenditure or a combination of both. Evaluations also highlight the willingness of health care professionals to provide nutritional messages which may be based on their own personal experiences of weight loss or sources such as internet and magazines, rather than formal education. Basic physical activity advice

can be provided effectively through a brief intervention based on government recommendations. However, many health care professionals do not feel confident in providing this information (Flocke, Kelly & Highland, 2009; Klumbiene, Petkeviciene, Vaisvalavicius & Miseviciene, 2006). Where practice nurses feel confident to encourage people to increase their activity levels, knowledge of the recommendations is poor (Douglas *et al*. 2006)

Clinicians' perceptions of treating obesity have been examined in studies, reflecting the increased number of patients presenting in primary care with obesity or obesity related medical conditions. One such study was conducted on clinicians working with the specific American cohort of veterans (Forman-Hoffman, Little & Wahls, 2006). The study included a questionnaire to clinicians. Clinicians who were willing to take part opted in and completed the questionnaire, therefore exposing the study to bias as clinicians who had an interest in obesity or who felt confident in their ability to treat obesity may have been more inclined to respond to the questionnaire.

The majority (64%) of the sample had personal experience of weight loss attempts, while 72% reported vigilantly watching their own diets. There is no

information provided to suggest that the clinicians had successfully lost weight or that their nutritional advice reflected clinical guidelines.

Respondents reported a gap in their training with respect to obesity management practices. This was reflected in findings by Allan, Hoddinott and Avenell (2010) comparing weight management practices in commercial and primary care settings with primary care respondents, reporting a lack of training compared to their commercial counterparts. Lack of training was cited by Forman-Hoffman and colleagues as the biggest barrier to discussing and treating obesity, suggesting that obesity treatment in primary care should be led by a professional specialising in the area with a relevant education and training background.

Patients interviewed by Allan and colleagues (2010) had differing views as to whether they preferred commercial or primary care weight management programmes. Commercial group leaders tended to be viewed as inspirational or empathetic, as they had often lost weight themselves, compared to primary care group leaders who tended to be viewed as professional and a reliable source of information. Commercial groups were viewed as more flexible in their timing compared to primary care. They were often viewed as trying to sell a product,

compared to primary care which was viewed as purely supporting the participant. The differing views emphasise the point that there is no one size fits all approach to weight management. High attrition rates for participants that do not see results from their weight management approach emphasises the need for the programmes to be successful.

Chapter 3

Hypotheses

and

Rationale

3.1 Research Question

Is 'Measure Up' an effective intervention, supporting participants to reduce body weight and waist circumference?

3.2 Hypotheses and Rationale

3.2.1 Null Hypotheses 1-4

- **Null Hypothesis 1** - There will be no difference in body weight at baseline and week six of 'Measure Up'.

- **Null Hypothesis 2 –** There will be no difference in body weight between baseline and week 12 of 'Measure Up'.

- **Null Hypothesis 3 –** There will be no difference in body weight between baseline and the follow up appointment at week 24.

- **Null Hypothesis 4 –** There will be no difference in body weight between week 12 of 'Measure Up' and the follow up appointment at week 24.

3.2.2 Rationale for Null Hypotheses 1-4

The aim of a weight management programme is to support participants to lose weight and maintain the weight loss. SIGN guidelines (1996) state that weight management programmes should aim to prevent further weight gain; reduce body weight and maintain body weight reduction.

3.2.3 Null Hypotheses 5 and 6

- **Null Hypothesis 5 –** There will be no difference in weight change of participants taking part in 'Measure Up' at three different venues

- **Null Hypothesis 6 –** There will be no difference in percentage weight change of participants taking part in 'Measure Up' at three different venues

3.2.4 Rationale for Null Hypotheses 5 and 6

An equitable service provision across Knowsley should include interventions that provide the same results. Similar rates of weight loss should be seen at all sites that 'Measure Up' is provided if it is the course rather than the facilitator that supports participants to lose weight.

3.2.5 Null Hypothesis 7

- **Null Hypothesis 7 –** There will be no difference in waist circumference at baseline and week twelve of 'Measure Up'

3.2.6 Rationale for Null Hypothesis 7

Guidance from NICE (2006) recommends that waist circumference should be used as a measurement in addition to BMI. A decrease in waist circumference is an indicator that abdominal adiposity has been reduced.

Chapter 4.

Method

4. Method

Changes in body weight and waist circumference in participants of the Knowsley 'Measure Up' weight management programme were analysed.

4.1 Study Design

Participants in the study were taken from those who were attending the 'Measure Up' programme, either as a result of self referral or health professional referral. One of the aims of 'Measure Up' is to provide a lifestyle intervention for Knowsley residents in their local area. Therefore, participants were not randomly assigned to a 'Measure Up' course. Randomly assigning participants to a course anywhere in the borough would create a barrier that would possibly have prevented them from participating in the course and ultimately preventing them from improving their health status.

There was no control group for the study. In Knowsley efforts are being made to reduce health inequalities, particularly those associated with overweight and obesity. This includes increasing access to lifestyle interventions. Delaying the start

of the intervention for the purposes of creating a control group may have resulted in participants being lost from the service. As motivation to lose weight can change over a period of time, it may have also caused participants of the control group to try dieting.

The study fits the criteria set out by Belli (2008) for non experimental studies. Participants are studied as they exist i.e. participating in a weight management programme in addition to and increasingly as part of their normal routine. They were not randomly assigned to groups or treatment options which would be unethical when trying to improve health status and not manipulated by the researcher i.e. allowed to participate in 'Measure Up' following the same processes as other participants on courses not included in the research study.

4.2 Ethical Considerations

Ethical approval for the study was granted by Liverpool Adults NHS Ethics Committee on 1st June 2009 (REC number 09/H1005/27, Appendix 9). The study was also approved by NHS Knowsley's Clinical Governance Panel. The original sample size was not deemed large enough to offer sufficient data analysis

so the ethics panel were contacted for an extension which was approved. Data collection commenced after ethical approval was received.

In accordance with Caldicott Principles (DoH, 1997), Data Protection Act (1998) and the NHS Confidentiality Code of Practice (DoH, 2003) patient data was eligible for analysis for the purpose of monitoring and improving health care.

4.3 Population

The study sample consisted of 42 overweight adults living in the borough of Knowsley, taking part in the 'Measure Up' weight management course. The course is available to both males and females but the study participants were predominantly female (male 3 female 39).

In order to complete 'Measure Up' as intended in its design, participants must be physically fit enough to take part in a low intensity aerobic exercise session. However, if individuals are not able to take part in exercise they are still able to participate in the education components of 'Measure Up'. As these individuals were part of the 'Measure Up' population they were given the opportunity to participate in

the intervention. It is acknowledged that participants who were not able to exercise may not have gained as much benefit from the study. However 'Measure Up' is a community weight management programme and the aim of the study is to evaluate the programme for effectiveness with community populations. Therefore it was important to have a study population that was reflective of the Knowsley residents taking part in 'Measure Up'.

The target population of 'Measure Up' is Knowsley adults with a BMI between 25-35kg/m^2. People may however self refer into the programme if they have a BMI lower than this value as 'Measure Up' addresses lifestyle issues and has the potential to support people to maintain a healthy weight and avoid weight gain. While this is not a common occurrence there is potential for people below the BMI range of 25-35kg/m^2 to be included in the cohort. Recruitment to 'Measure Up' is detailed in Appendix 6.

The 'Knowsley Obesity Pathway' recommends that adults with BMI greater than 30kg/m2 should have the option of attending the dietetic led weight management service 'Changes'. Occasionally people with a BMI greater than 35kg/m^2 may attend 'Measure Up' with a friend or relative if each of their BMI defines that they

should be in different programmes. It is deemed more beneficial for these people to attend 'Measure Up' together and support each other through their weight loss journey, than attend different programmes and potentially quit due to lack of a support network.

A participant information sheet (Appendix 5), written in lay terms, using non technical language to clearly explain the aims and purpose of the study was distributed to each participant. Involvement in the study was voluntary. Participants were given the option to opt out of participation in the study at anytime. It was explained to them that they would still be allowed to participate in 'Measure Up' as it is a service offered by Knowsley Community Health Development Team and a service that is aimed at improving their health. Anybody opting out of the study or declining to take part received the same intervention as participants in the study but their data was excluded.

Participants were provided with two informed consent forms (Appendix 4) which were signed by themselves and the researcher. One copy each was kept by the participant and researcher.

4.4 Sample

The planned sample size that ethical approval was granted for was 15 participants from two courses running in the Whiston and Kirkby areas of Knowsley. Twelve participants were recruited from the Whiston venue and nine from Kirkby. As only 19 participants completed the intervention phase (weeks 1-12) of 'Measure Up', ethical approval was extended to recruit another cohort from Knowsley Village, resulting in an additional 21 participants. There were 39 females and three males taking part in the study.

Individuals taking part in 'Measure Up' completed a Physical Activity Readiness Questionnaire (PARQ) as part of the standard health and safety requirements. The physical activity component of 'Measure Up' was designed based on increasing time and intensity of an aerobic exercise programme throughout the course. As more courses have been delivered this has evolved to include chair based exercise or no exercise for those individuals not able to take part. No record is included in this study as to which type of exercise, if any, participants took part in. These participants were not excluded from the study in order to have a sample size that is reflective of individuals accessing the 'Measure Up' programme.

Table 4.1 Sample Characteristics

Site	Male	Female	Mean weight (kg)	Sd weight	Mean height (m)	Sd height	Mean BMI (kg/m^2)	Sd BMI
Kirkby	0	9	85.86	17.71	1.60	0.05	33.26	5.96
Whiston	0	12	81.87	14.15	1.62	0.06	30.99	4.36
Knowsley Village	3	18	75.41	18.49	1.60	0.08	29.38	5.52

Sd = standard deviation

4.5 Variables

There were two dependent variables studied. These were body weight and waist circumference.

The independent variable studied was participation in the 'Measure Up' programme.

Recognised confounding variables may include; prescribed medication to assist with weight loss, leisure time activities undertaken, other lifestyle interventions being undertaken e.g. smoking cessation or weight loss in the weeks preceding enrolment in the programme.

4.6 Procedures

Participants attended 13 weekly sessions of 'Measure Up' (Intervention Phase). Baseline anthropometric measurements of body weight, height and waist circumference were measured by a Community Health Development Officer in session one. Body Mass Index (BMI) was calculated from height and weight measurements.

Body weight was measured at session 13 (week 12), and session 7 (week 6) for all participants and twelve weeks after completion of the programme. Waist circumference was measured at week 12. Participants were encouraged to wear light comfortable clothing for all sessions to improve accuracy of anthropometric measurements.

4.6.1 Weight

SECA electronic class III scales (SECA, Birmingham, UK) were used to weigh participants. Scales were calibrated yearly to maintain accurate readings. Body weight was measured in accordance to protocol (Appendix 1). Weight was measured in kg to one decimal place.

4.6.2 Height

A portable free standing height measure (Leicester Height Measure) was used to measure participant's height. The height measure was assembled according to instructions. Height was measured in accordance with protocol (Appendix 2). Height was recorded to the nearest centimeter.

4.6.3 Waist Circumference

Waist circumference was measured using a SECA circumference tape (SECA, Birmingham, UK). Participants were encouraged to wear loose, light clothing e.g. t-shirt. Waist circumference was measured in accordance with protocol (Appendix 3)

The recommended site for a waist measurement is the mid point between the hip and lower rib bone (WHO, 2010). However, as these measurements were being recorded in a community setting it was important that people were comfortable with the method used to take measurements. The site of the naval was used so that repeat measurements were accurate.

Participants were notified of all their anthropometric data and recorded it in their course booklet. Their numerical BMI and classification, according to WHO, was provided to them.

Participants were informed of the weight loss required for them to achieve a 5% and 10% decrease in body weight. They were advised of sensible weight loss targets of 0.5-1kg per week (NICE, 2006).

4.6.4 Monitoring Tools

Participants were given the option of being weighed by their course leader according to the protocol detailed. If participants declined a weekly weight measurement they were encouraged to have weight monitored at six and twelve weeks. The course leader kept a record of these measurements which were available to the participant. Participants were provided with a record booklet by the Community Health Development Team so that they could monitor their own weight.

Participants were provided with pedometers and diary sheets to keep a record of their food intake and activity levels. Data from the food diaries and pedometers are not used in this study as they were used as motivational tools to increase awareness of eating habits and activity levels and as such are not routinely collected by course leaders during 'Measure Up'.

There is a lack of accuracy with self reporting tools such as food and activity levels and with no way of validating accuracy of reporting in a community setting they were disregarded as tools in the study (Speck and Looney, 2006). While pedometers may have added accuracy to the reporting of activity levels they do not measure water based activity or cycling and are less accurate when used by an

obese individual so were excluded from the study (Crouter, Schneider & Bassett, 2005).

Participants were invited to meet with their course leader 12 weeks after completing 'Measure Up' where a further weight measurement was recorded according to the protocol.

4.7 Data Management

Data was stored on a password protected computer. Data was anonymised, removing any identifiable features such as name, initial, date of birth. The confidentiality and anonymity of participants were assured by assigning each participant a unique study number. Study identification numbers were matched to participant information on a separate secure database in case of participants wanting to opt out of the study at a later date.

4.8 Data Analysis

The number of participants starting the study was 42. Participants were encouraged to attend all sessions; however participants missed sessions throughout the course (table 4.2), particularly the follow up appointment, therefore numbers fluctuated throughout the study. Lower numbers adversely affect the reliability of statistical analysis as one result has a bigger impact on the data set. Therefore data was only analysed at each stage for participants with a full data record.

Table 4.2 Participants Grouping

Group	Session Numbers Attended	Numbers Attending
A	1 and 7 and 13	24
B	1 and 13	35
C	1 and 13 and 14	7

Data was analysed using SPSS version 14.0 for Windows (SPSS inc. Chicago IL)

All data was tested for normality of distribution using the Shapiro-Wilk test, as the sample size was less than one hundred (Coakes & Steed, 2006). A significance

level of 0.05 was applied to the test results (Franks & Schuyler, 1986). Any data set yielding a result greater than 0.05 was deemed to be normally distributed. If data was normally distributed it was tested for homogeneity of variance.

Mean values and standard deviations were used for normally distributed data, while median values and range was used for data that failed the test for normality.

Data which had assumed normal distribution and homogeneity of variance had parametric statistical tests applied; non normally distributed data had non parametric tests applied. As follows:-

Hypothesis 1 - There will be no difference in body weight at baseline and six weeks.

Hypothesis 2 - There will be no difference in body weight between baseline and 12 weeks.

Data was not normally distributed (P=0.000). The non parametric test for repeated measures, the Friedman test was used to analyse the data.

Hypothesis 3 - There will be no difference in body weight between baseline and 24 weeks.

Hypothesis 4 – There will be no difference in body weight between 12 and 24 weeks.

The sample did not pass tests for normality with P values of 0.001, 0.002 and 0.010 for baseline weight, week 12 weight and week 24 weight respectively. The non parametric test for repeated measures, the Friedman test was used for analysis.

Hypothesis 5 - There will be no difference in weight change of participants at the three different sites.

Hypothesis 6 - There will be no difference in percentage weight change between the three different sites.

Normal distribution was assumed using the 0.05 confidence interval for weight change (P=0.382, P=0.062, P=0.316) and, for percentage weight change (P=0.672, P=0.066, P=0.814). Homogeneity of variance was also assumed. Therefore, the parametric test Simple Independent Groups Analysis of Variance was used to test the hypotheses with post hoc Tukey analysis conducted.

Hypothesis 7 - There will be no difference in waist measurement at baseline and 12 weeks.

This data was normally distributed using the Shapiro-Wilk test for normality (P=0.471 at baseline and P= 0.702 at 12 weeks) so the parametric paired samples T-Test was used to test the hypothesis.

Chapter 5.

Results

5. Results

The sample size at the start of the study was 42, reducing to 35 at 12weeks and nine at 24 weeks. The data analysis was completed separately for the intervention phase (group A) and post course measurements (group C), due to the decreasing sample size.

5.1 Attendance of Participants at Each Site

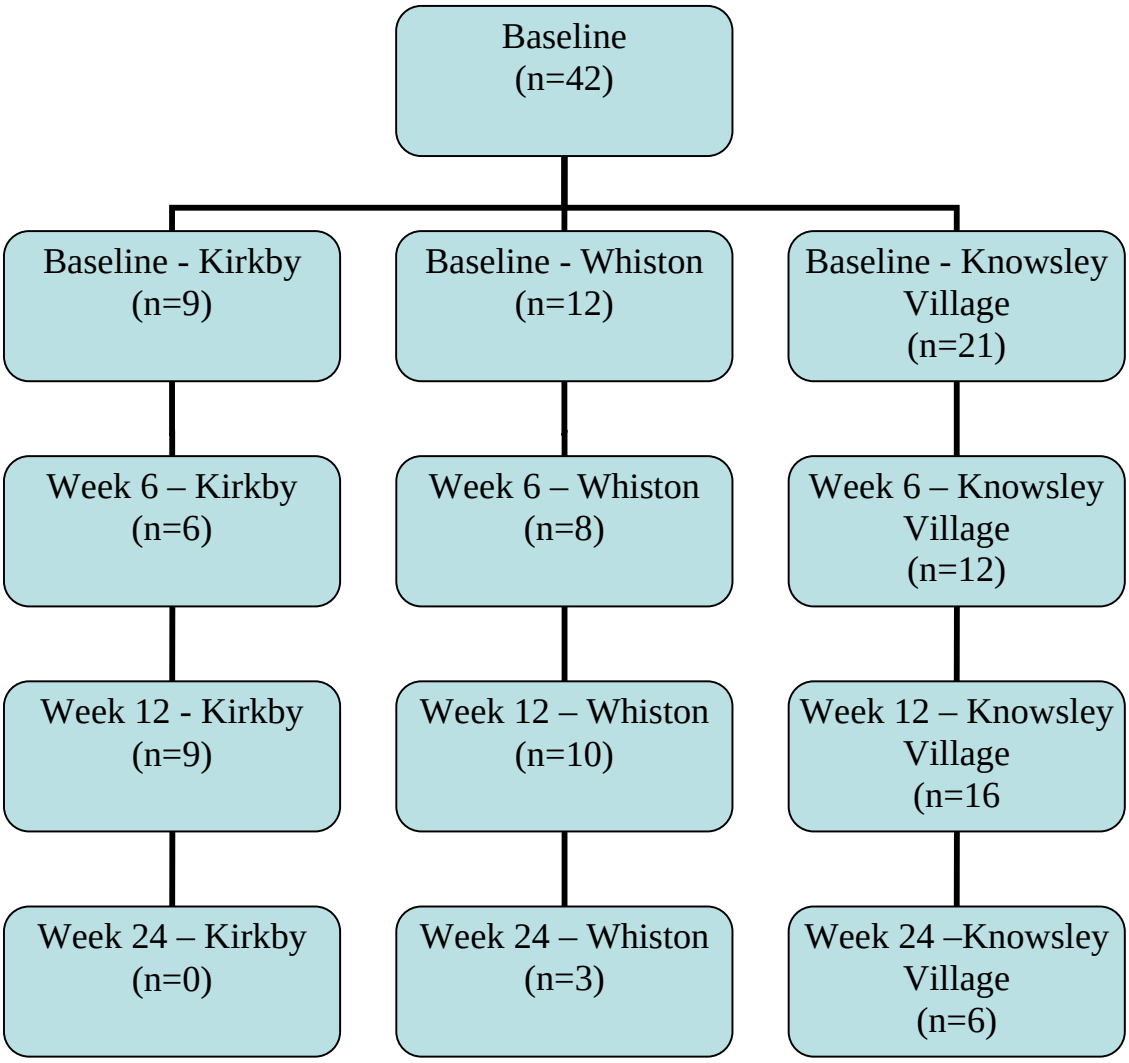

Figure 5.1 Participant numbers throughout the 'Measure Up' process

5.2 Summary of Results

Table 5.1 Summary of Results for 'Measure Up' Course Completers

Eligible Participants	Category	Baseline	Week 6	Week 12
N=24 (Group A)	Median Weight (kg)	75.10	74.15	73.25
	Range	89.40	88.50	89.50
	Mean (kg)	77.89	76.82	75.75
	Standard Deviation	18.40	18.14	17.94
N=35 (Group B)	Median BMI (kg/m^2)	29.51		28.78
	Range	5.50		5.38
	Mean (kg/m^2)	30.67		30.03
	Standard Deviation	5.41		5.38
N=32 (Group B)	Mean Waist Circumference (cm)	98.70		99.39
	Standard Deviation of Waist	11.85		11.35
N=35 (Group B)	Mean Weight Change (kg)			-1.84
	Standard Deviation			1.96
N=35 (Group B)	Mean Percentage Weight Change			-2.39
	Standard Deviation			2.55

(Where data set is not normally distributed both a median and mean value are provided)

Table 5.2. Summary of Results of Participants Attending Follow Up Appointment at 24 weeks (Group C)

		Baseline	Week 12	Week 24
N=7 (Group C)	**Median Weight**	75.30	71.50	71.50
	Range	73.60	75.00	71.90
	Mean	81.60	79.74	79.14
	Standard Deviation	25.99	26.32	25.49

5.3 Attrition Rates

The twelve week intervention period of 'Measure Up' course was completed by 83.3% of the cohort. This fell to 21.4% attending their follow up appointment where an assessment of weight maintenance was made. Despite 100% of participants completing the 'Measure Up' course in Kirkby, nobody attended the follow up appointment whereas Knowsley Village had the lowest percentage completing the course but the highest percentage attending their follow up appointment.

Table 5.3 Completion Rates

Site	Baseline Numbers	week 6 Numbers	week 12 Numbers	week 24 Numbers	% completion 'Measure Up'	% attending follow up
Kirkby	9	6	9	0	100.00	0.00
Whiston	12	8	10	3	83.33	25.00
Knowsley Village	21	12	16	6	76.19	28.57
Total	42	26	35	9	83.33	21.43

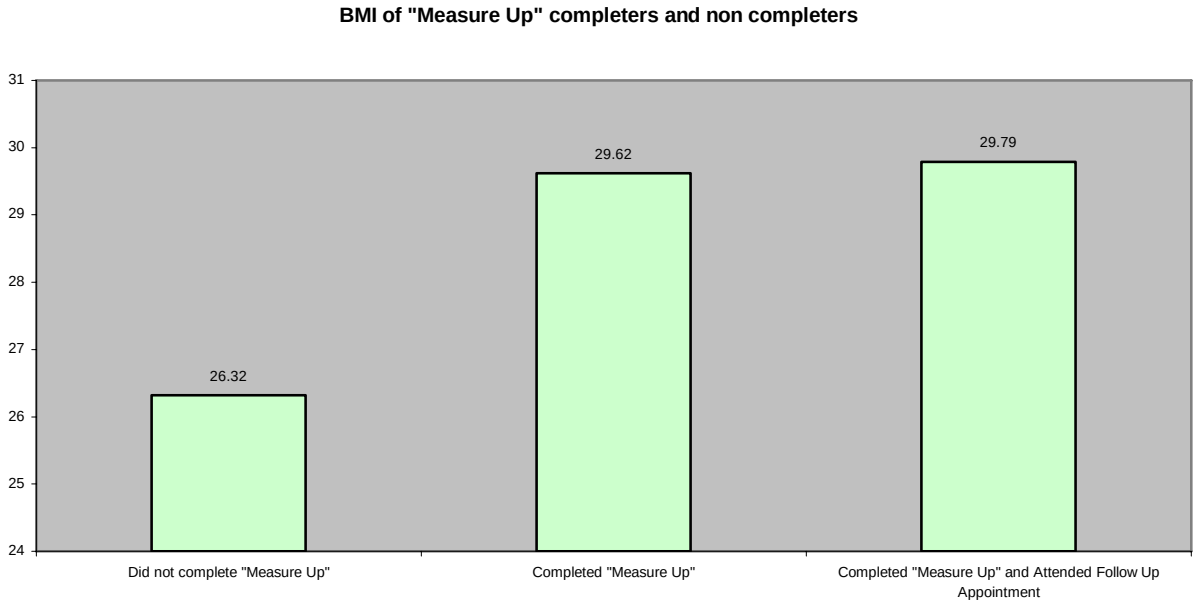

Figure 5.2 BMI (kg/m^2) of participants not completing each stage of 'Measure Up'.

There was no significant difference (P=0.343, C=2.138) between the starting BMI of participants who did not complete the course (n=5, median BMI = 26.32 kg/m^2 range= 9.61); those who completed the course but did not attend their follow up appointment (n=28, median BMI=29.62kg/m^2, range=22.46); or those that attended their follow up appointment (n=9, BMI=29.79 kg/m^2, range=18.77)

5.4 Testing Hypotheses

Hypothesis 1 - There will be no difference in body weight at baseline and 6 weeks.

Hypothesis 2 - There will be no difference in body weight between baseline and 12 weeks.

'Measure Up' is a community weight management programme and as such includes participants with a large range of body weight (figure 5.3).

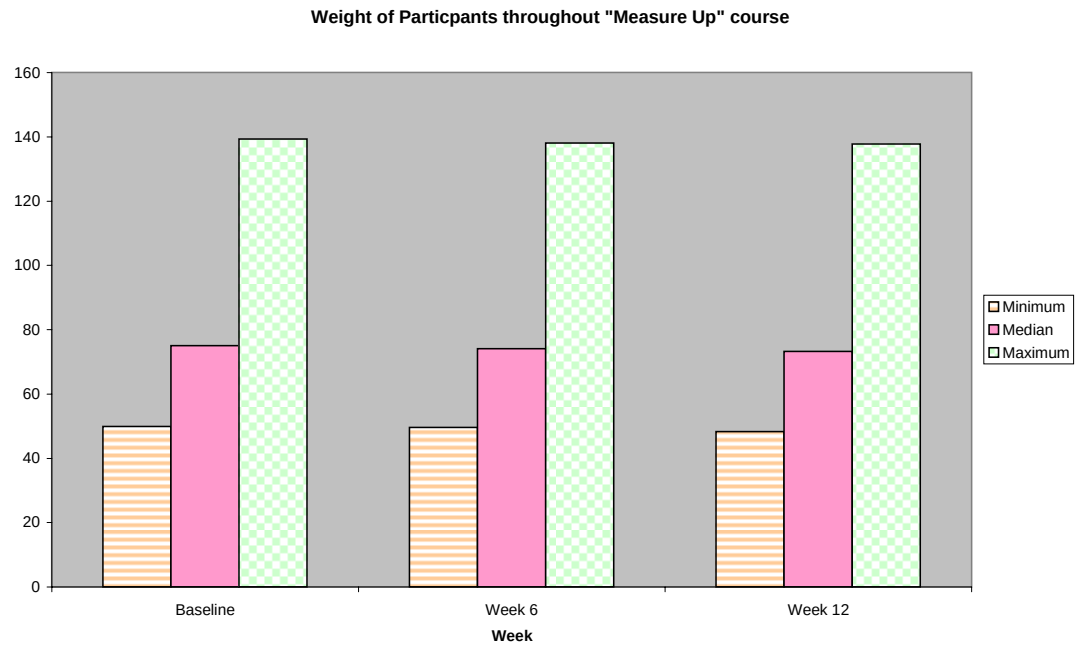

Figure 5.3 Body Weight of Participants Completing 'Measure Up' (Group A)

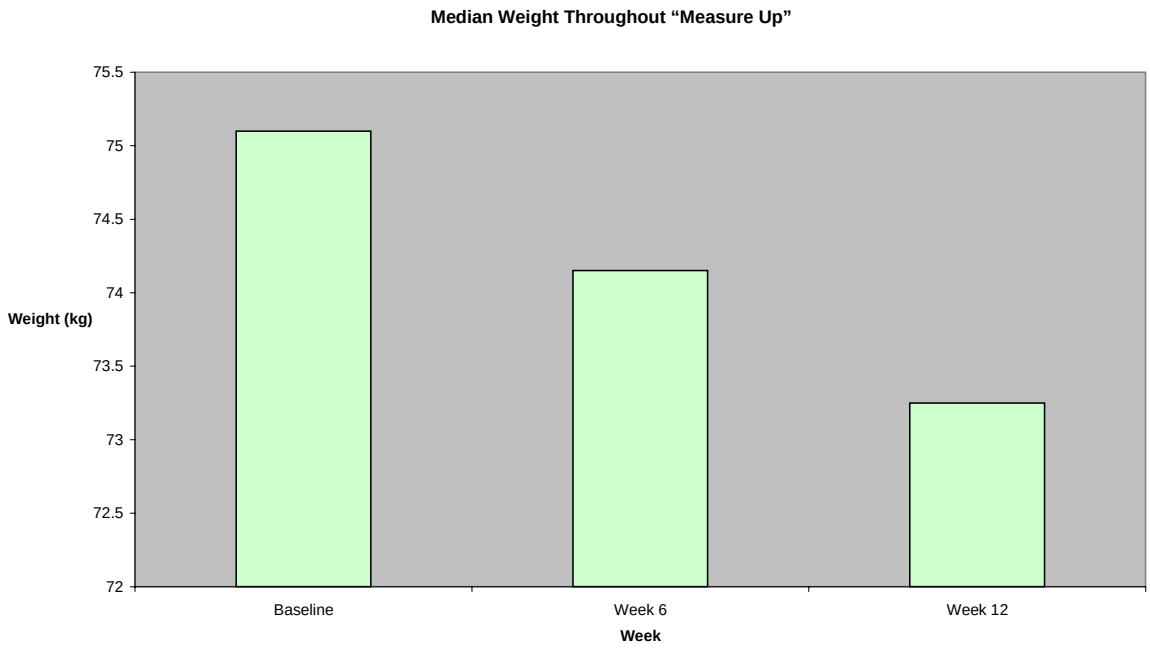

Figure 5.4 – Median, minimum and maximum body weight body weight at baseline, week 6 and week 12.

There is a significant difference (P= 0.000, Z=-3.699), between body weight of participants in group A (n=24) at baseline and week 6. The median value for body weight at baseline is 75.10kg (range 89.40) compared to 74.15kg at week 6 (range 88.50kg).

With a median value of 71.5kg for body weight at week 12 there is a significant difference (P=0.001, Z= -4.267) between baseline and week 12. The range of measurements continues to be high at week 12 with a range of 75kg between the minimum and maximum recorded body weight of the sample.

At week 12, 20.6% of participants in group A (n=7) lost >5% body weight, 58.8% (n=20) lost 0.1-4.9% body weight, while 20.6% (n=7) gained weight.

Hypothesis 3 - There will be no difference in body weight between baseline and 24 weeks

Hypothesis 4 – There will be no difference in body weight between week twelve and 24.

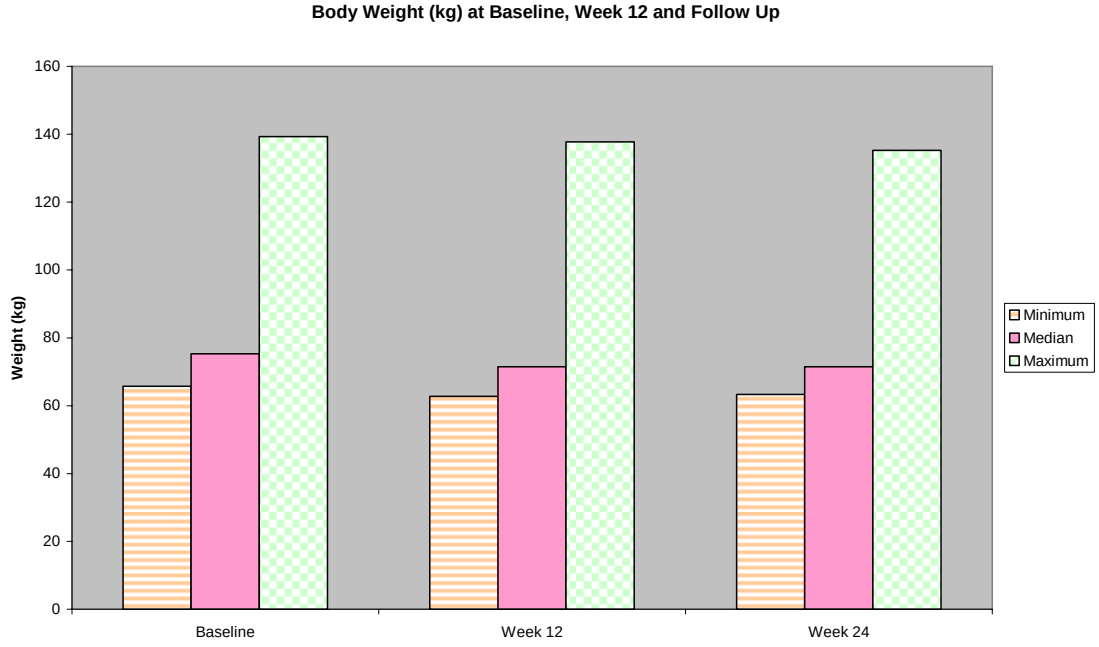

Figure 5.5 – Median, minimum and maximum body weight at baseline, week 12 and week 24.

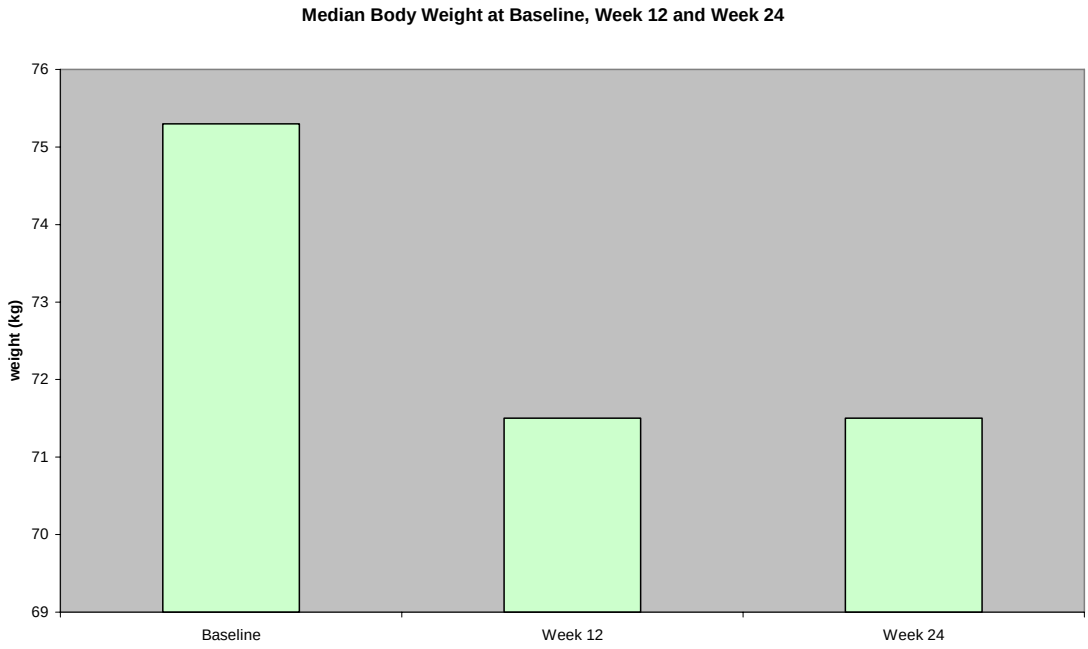

Figure 5.6 Median Body Weight of group C at Baseline, Week 12 and Week 24

Seven participants (group C) attended both week 12 of 'Measure Up' and the follow up appointment. Group C presented median weight values for baseline, week 12 and week 24 of 75.30kg, 71.50kg and 71.50kg respectively. There was a significant difference (P=0.017, Z= -1.378) in body weight between baseline and the follow up appointment at week 24 but no significant difference in body weight between the end of the 'Measure Up' programme at week 12 and the follow up appointment at week 24 (P=0.168, Z= -1.378). The median value for body weight remained the same at 71.50kg, although the range in body weight between lowest and highest recorded weight reduced from 75kg to 71.9kg.

Hypothesis 5 - There will be no difference in weight change of participants at the 3 different sites.

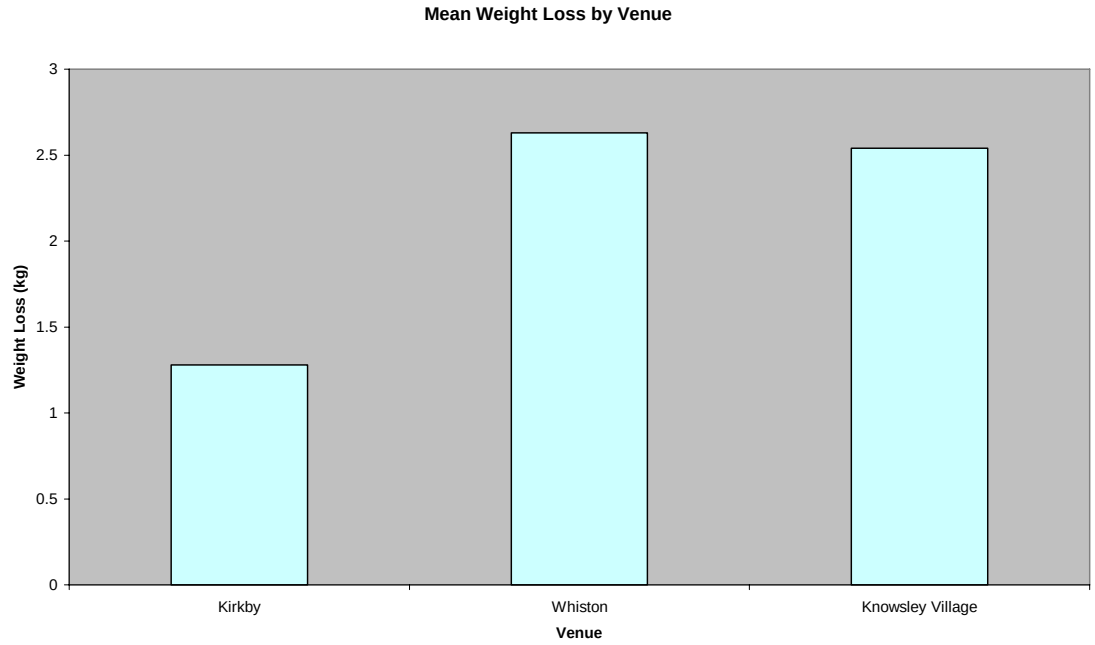

Figure 5.7 Mean weight loss by venue

There is no significant difference (P=0.504, F= 0.708) between the mean weight loss at each venue (group B). Whiston saw the biggest mean weight loss (2.63kg sd 2.62), followed by Knowsley Village (2.52kg sd 1.66) and Kirkby (1.28kg sd 2.21). Although there were numerical differences between the sites these differences were not deemed statistically significant.

Hypothesis 6 - There will be no difference in percentage weight change between the 3 different sites.

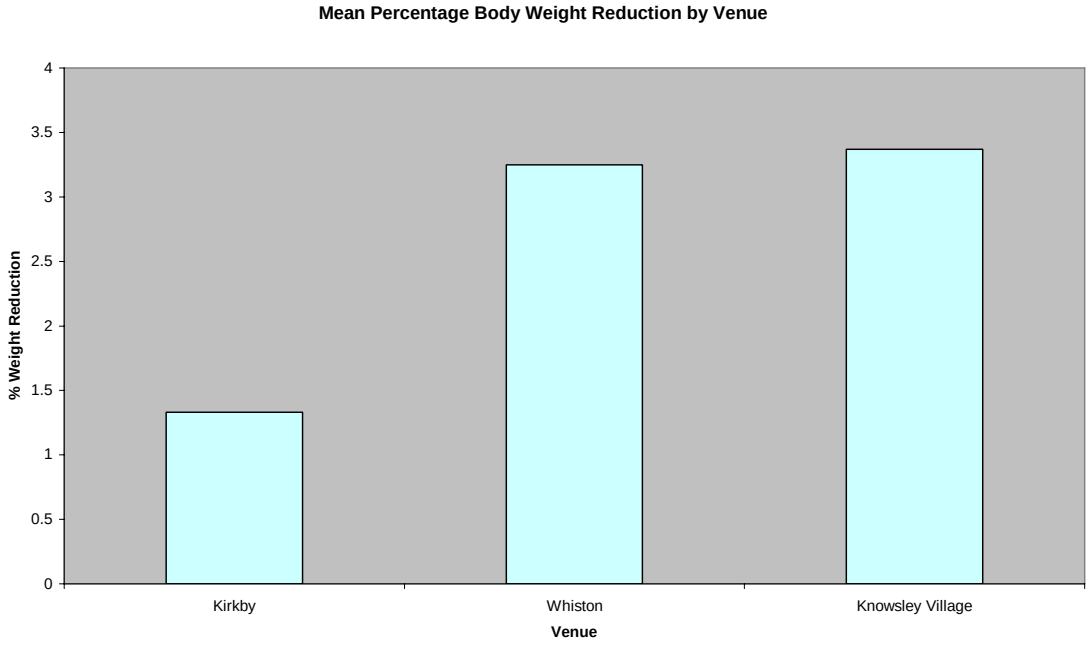

Figure 5.8 – Mean percentage body weight reduction at the three different sites of 'Measure Up'.

Complementing the results for body weight reduction (group B) there is no significant difference (P=0.282, F=1.351) in percentage body weight reduction

between the three different sites that 'Measure Up' was delivered. The mean reduction in percentage body weight for Knowsley Village and Whiston were similar at 3.37% and 3.25% respectively with standard deviation values of 2.37 and 3.23 respectively. Despite mean percentage weight loss at Whiston being higher than that at Knowsley Village, percentage weight loss at Knowsley Village was higher. The mean percentage body weight reduction at Kirkby was 1.33% with a standard deviation of 2.13.

Hypothesis 7 - There will be no difference in waist measurement at baseline and 12 weeks.

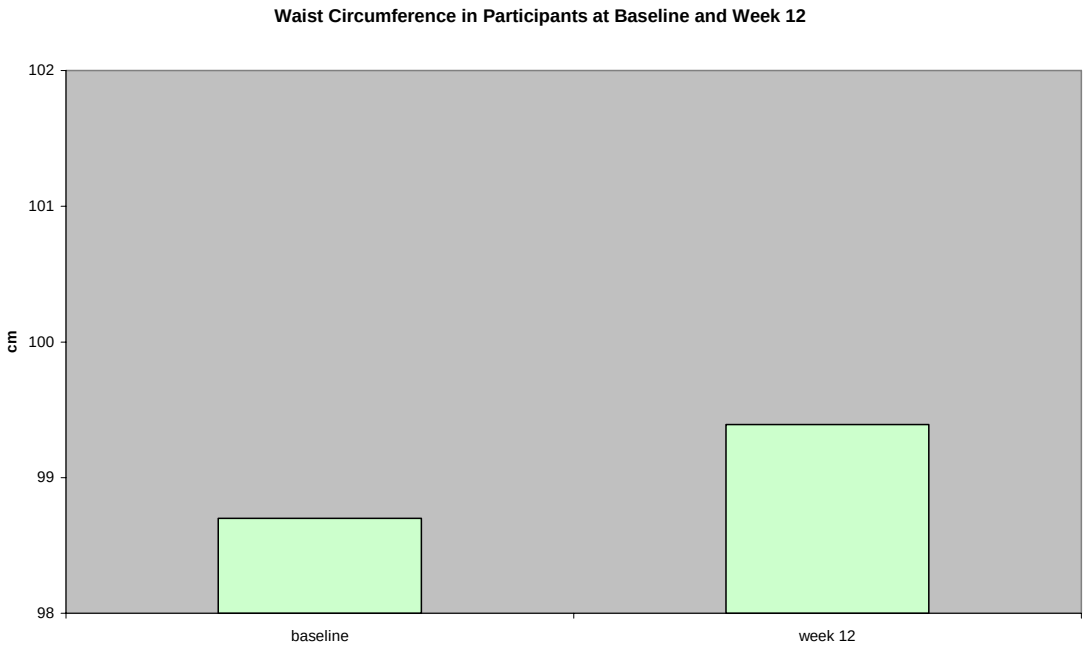

Figure 5.9 Waist Circumference of group B at Baseline and Week 12

The mean waist circumference of participants in group B (n=32) increased from baseline (98.70cm) to week 12 (99.39cm). The increase in waist circumference was not found to be statistically significant (P=0.452, t= -0.762). Standard

deviation scores of 11.85 and 11.35 for baseline and week 12 respectively indicate a large range of waist circumferences at both baseline and week 12.

Chapter 6.

Discussion

and

Conclusion

6.1 Discussion

6.1.1 Attrition Rates

The attrition rates for participants attending 'Measure Up' differed during the intervention stage and post course. Attrition rates during the intervention were 16%. This compared favourably to other weight management programmes that were conducted over a similar time frame. Participants who were given 12 vouchers for Slimming World and Weight Watchers had attrition rates of 54% and 32% respectively (Ahern *et al*., 2011; Lavin *et al*., 2006). The most similar programme to 'Measure Up' was delivered in primary care over 14 weeks and evaluated by Read *et al*. (2004). This programme resulted in an attrition rate of 40%.

The attrition rate at the post course appointment three months after completion of the programme was 79%. There was a smaller number of participants attending the follow up appointment (n=9) compared to those attending the final session of 'Measure Up' sessions (n=35). This compares poorly with other studies. Read *et al* (2004) reported an attrition rate of 65% at 12 months; Lavin *et al* (2006) reported a rate of 63% at six months; Jebb and colleagues (2011) reported 64%

attrition rates in the UK after distributing Weight Watchers vouchers for 12 months and Truby and colleagues (2006) reported attrition rates of 28% when comparing different diets at six months although the supported programmes of Rosemary Conley and Slimming World saw lower attrition rates.

Similar completion rates were observed across the three sites at the end of the 12 week programme; Kirkby 100%, Whiston 83% and Knowsley Village 76%. Completion rates at six months were 0% at Kirkby, 25% at Whiston and 29% at Knowsley Village. Participants were only given one opportunity to attend a follow up appointment after the completion of the course. This was held in the same venue at the same time that their course had run. However if they were not able to attend due to illness or a prior commitment they were classed as lost to follow up. A more flexible approach to this appointment may have led to higher completion rates.

There was no statistical difference (C=2.138, P=0.343) in the starting BMI of participants completing the different phases of 'Measure Up'. However mean starting BMI is highest in participants who completed 'Measure Up' and attended

their follow up appointment, followed by those that completed 'Measure Up' and lowest in those that did not complete 'Measure Up'

Previous studies have identified that greater rates of initial weight loss lead to long term success (Nackers, Ross & Perri, 2010). Those people starting 'Measure Up' with the lower BMIs may have found that motivation to adhere to the programme decreased as they were not seeing rapid weight loss as they didn't have as much weight to lose. This is consistent with the findings of Garaulet *et al.* (1999) when examining reasons for attrition rates, 23% of the cohort cited a search for faster weight loss often via a fad diet as a reason to leave the programme.

6.1.2. Hypotheses 1 and 2

Hypothesis 1 – There will be no change in body weight between baseline and week six.

Hypothesis 2 – There will be no change in body weight between baseline and 12 weeks.

There is an average reduction in body weight of 0.95kg between baseline and six weeks (P= 0.000, Z=-3.699) and a reduction of 3.6kg from baseline to 12weeks (P=0.001, Z=-4.267), the end of the 'Measure Up' course. Null Hypotheses 1 and 2 are therefore rejected.

There is an average body weight reduction of 4.79% during 'Measure Up'. At week 12, 20.6% of participants in group A (n=7) lost >5% body weight, 58.8% (n=20) lost 0.1-4.9% body weight, while 20.6% (n=7) gained weight. These results comply with SIGN guidelines to primarily prevent excess weight gain and support weight loss within three to six months

There is a greater rate of weight loss in the second half of the 'Measure Up' course with an average weight loss of 2.65kg between weeks six and twelve compared to 0.95kg from baseline to week six. It is unusual for weight loss to increase in the second half of the course. Initial weight loss during weight management interventions is usually at an increased rate (Finkler, Heymsfiel & St Onge, 2012). NICE guidance for obesity (2006) recommends a steady weight loss of 0.5-1kg per week. The overall weight loss at 'Measure Up' is a slightly slower rate than this at 0.3kg per week; the weight loss in the first half of the

course at 0.16kg per week is significantly slower than recommended and the weight loss in the second half of the programme is closer to recommendations at 0.44kg per week. The rate of weight loss is indicative of loss of fat stores. High rates of weight loss indicate the loss of fluid and carbohydrate stores, while it is the loss of fat stores which are beneficial to health (Adam-Perrot, Clifton & Brouns, 2006).

The increased rate of weight loss in the second half of the course may have increased the motivation in those remaining in the programme, while the attendance of 26 participants at week six may have been reflective of the slower rate of initial weight loss.

The average weight loss at 12 weeks of 3.6kg compared favourably to the study by Chambliss and colleagues (2011) where the two experimental groups lost an average of 2.7kg and 2.5kg after the 12 week intervention period of internet based support. When text message support was studied by Haapala *et al*. (2009) weight loss at three months was 4.5kg which was a higher rate than the participants of 'Measure Up'.

Weight loss in a variety of settings was studied by Jolly *et al*. (2010). Weight loss occurred at a higher rate to that seen during 'Measure Up' in the commercial settings, however all programmes saw an average weight gain between 12 weeks and one year. At 12 weeks Weight Watchers participants lost an average of 5.15kg, Slimming World participants lost 4.25kg and Rosemary Conley participants lost 5.29kg. In the same study a dietetic group-based weight management service saw a body weight reduction of 3.22kg, a similar rate to 'Measure Up', while GP and Pharmacy one-to-one counselling saw weight reductions of 3.22kg and 2.80kg respectively, a lower rate to the 3.6kg in the intervention stage of 'Measure Up'. A further study of Slimming World participants by Lavin *et al*. (2006) had an average weight loss of 5.4kg after 12 weeks, a higher rate than 'Measure Up'.

In Primary Care, Read *et al*. (2004) reported a mean weight loss of 2.9% at three months in participants who completed the group education intervention stage. This programme is comparable to 'Measure Up' in that it was run by primary care, was free to participants and comprised of a series of education sessions. The education sessions of 'Measure Up' were more intensive, running every week compared to every two weeks. 'Measure Up' also contained a weekly exercise session. The weight loss and attrition rates in 'Measure Up' compare favourably, however the

sample size of 216 in the study by Read *et al*. is considerably higher than that of this study.

6.1.3. Hypotheses 3 and 4

Hypothesis 3 – There will be no difference in body weight between baseline and 24 weeks.

Hypothesis 4 – There will be no difference in body weight between 12 and 24 weeks.

The results for differences in body weight between baseline and 24 weeks showed a reduction of 3.8kg from 75.3kg to 71.5kg (P=0.017 Z= -2.38). Therefore null hypothesis 3 is rejected.

There was no difference (P=0.168, Z= -1.378) between body weight at week 12 and week 24 as average body weight remained at 71.5kg. Therefore, null hypothesis 4 is accepted.

Success of a weight management intervention could be interpreted as one that equips the participant to maintain weight loss and over a short period of time and 'Measure Up' has done that. However, the follow up period of 12 weeks after

completion of intervention is shorter than many studies which take a final weight measurement at 12 months (Haapala *et al.*, 2009; Jolly *et al.*, 2010; Read *et al.*, 2004; Jebb at al., 2011). A longer follow up period would be required to comment further on maintenance of weight loss.

The weight loss of 3.8kg for participants attending both week 12 and week 24 appointments is equivalent to a mean reduction in body weight of 5.04%, which is a clinically and statistically significant marker and associated with improved lipid profiles, blood pressure and glucose regulation (Jung, 1997). The decreasing numbers but relatively successful weight loss of those attending the follow up appointment may indicate that other participants were less successful and chose not to attend the follow up appointment for that reason.

The lower numbers eligible for analysis after the follow up appointment have the potential to affect the mean weight loss. If the majority of participants lose weight while one person gains a large amount of weight the result could still equal a net maintenance. As numbers decrease. the results of one participant has a larger affect on the sample.

Collins *et al*. (2010) studied weight loss at six months for participants using a computer package; the experimental group had a better rate of weight loss at six months of 5.3kg compared to the average weight loss of 3.8kg at 'Measure Up'. The control group, who were self regulating diet and activity levels performed comparably to the 'Measure Up' cohort with a weight loss of 3.5kg. The socio-economic status of the two cohorts are likely to be very different as 'Measure Up' was run in a deprived community setting in Knowsley and Collins *et al*. studied a cohort in a university.

Bye *et al*. (2005) studied men attending Slimming World and reported weight loss at six months as 11.4%. This is a higher rate than the 5.04% of 'Measure Up'. It should be noted that the 'Measure Up' cohort is predominantly female however Lavin *et al*. (2006) reported a weight loss of 11kg at 24 weeks in a predominantly female Slimming World cohort, which is a significantly higher rate than 'Measure Up'.

Primary Care programmes studied by Gaynor *et al*. (2009) and Haapala *et al*. (2009) reported weight loss at six months of 4.5kg and 5.2kg respectively. Both

of these studies had a higher rate of weight loss than 'Measure Up' despite 'Measure Up' providing a slightly better rate of weight loss during intervention.

The research by Donaldson (2010) highlighted the importance of an effective exit strategy for participants completing a weight management group intervention. The use of a text message intervention resulted in improved weight loss of 1.6kg at 12 weeks compared to a weight gain of 0.7kg in the control group. The use of an effective intervention on completion of the group phase saw continued weight loss, which 'Measure Up' did not and lower attrition rates, which are likely to be due to the ongoing contact with the weight management service.

6.1.4 Hypotheses 5 and 6

Hypothesis 5 – There will be no difference in weight change of 'Measure Up' participants at the three different sites.

Hypothesis 6 – There will be no difference in percentage weight change of 'Measure Up' participants at the three different sites.

The results for weight change at different sites showed that there was no significant difference in weight change at each of the three sites of Knowsley Village, Whiston and Kirkby (P=0.547, F=0.615). Therefore, null hypothesis 5 is accepted.

The results for percentage weight change at different sites showed that there was no significant difference (P= 0.285, F=1.307). Therefore, null hypothesis 6 is accepted.

It is important for a weight management programme like 'Measure Up', which is delivered across the borough of Knowsley by different facilitators, to have consistency in delivery style, the information that is provided and ultimately the weight loss experienced by participants. A standardised format and delivery style was adhered to across all sites.

There was no significant difference in weight loss between the three sites of Knowsley Village, Whiston and Kirkby. There were some differences, whilst not statistically significant, in average weight loss between the three sites. Knowsley

Village, which had the largest number of participants had an average weight loss of 2.07kg, Whiston had 2.05kg and Kirkby 1.21kg.

The differences in body weight reductions across the three sites suggest that further studies would need to be conducted across all sites in Knowsley where 'Measure Up' is delivered as there is a possibility that facilitator rapport with the group could have an impact on weight loss of participants. It is important that participants trust their group facilitator and have faith in their abilities to provide accurate information. The importance of this relationship was highlighted by Pallister *et al.* (2009). Participants of Primary Care weight management programmes and commercial programmes reported the qualities that they valued in their group leaders. Primary Care participants valued the professionalism and knowledge base that their group leaders displayed while commercial participants valued the empathy shown by many of the leaders who had previously lost weight themselves. It is likely that each group would not have succeeded as well in the alternative sector as they identified with an approach that suited them.

There was no significant difference in percentage weight loss at the three sites. The mean percentage weight loss at both Whiston and Knowsley Village was 2.81% and 1.22% suggesting some differences, though not significant, in the percentage weight loss of the Kirkby group compared to the other two sites. The profile of the areas should be taken into account as a contributing factor. Whilst the socio-economics of an area do not define participants attending 'Measure Up', both Whiston and Knowsley Village have higher education levels, average household income and higher life expectancy than Kirkby (Appendix 7). Socio-economic status, particularly in women negatively correlates with obesity (The Information Centre for Health and Social Care, 2012) Healthy Literacy levels are linked to a number of factors, including education levels and can impact on the extent to which health messages are understood and implemented (Rudd, 2007).

6.1.5 Hypothesis 7

Hypothesis 7 – There will be no difference in waist measurement at baseline and 12 weeks.

There was no significant difference (P=0.547, F=0.615) in waist measurement at baseline and week 12. Therefore, null hypothesis 7 is accepted.

There was a slight increase, although not significant, in waist circumference of participants attending 'Measure Up'. Mean waist circumference increased from 98.7cm at baseline to 99.39cm at week 12, providing an increase of 0.69cm. At less than 1cm this result is negligible in terms of its significance of increase in waist circumference. Waist circumference is recorded as a low cost, accessible method of measuring changes in abdominal adiposity. It is surprising that the cohort saw a decrease in percentage body weight of 4.79% yet waist circumference was not affected.

There is a possibility that the methods used to measure waist measurement led to inaccuracies in reporting the data. As the measurements were recorded in the group settings which were in community centres and not clinics, privacy for participants was limited. Waist measurements were taken over light clothing at the site of the naval rather than at the clinical waist of the mid point between the lower rib and hip. The style of clothing would have affected this measurement. For example, tight fitting light material would add less to the waist circumference than a

loose fitting t-shirt which would add excess material to the measurement. As the measurement was taken at the site of the naval it may have been more accurate to ask participants to measure their own waist circumference in private, however this process would be prone to misreporting.

The WHO (2011) issued guidance on measuring waist circumference. They documented error rates of 1.31cm and 1.56cm from intra measurer and inter measurer error respectively. They also documented a positive correlation between weight loss and decrease in waist circumference at a rate of 4.5cm for males and 3.3cm for females for a 4.5kg weight loss.

The majority of weight management studies report results in terms of weight loss and percentage weight loss. This may underline the difficulty of assessing waist circumference in addition to body weight in a community session such as those delivered by the commercial sector, due to lack of privacy, time constraints and the perception of waist measurement as a clinical or intrusive measure. Interventions delivered via technology would rely on self reporting which is often less accurate than measures reported by a researcher and primary care interventions are less likely to be available in academic literature. Haapala *et al*. (2009) reported a waist

circumference reduction of 4.5cm after 12 months of a text messaging intervention which was accompanied by a body weight reduction of 4.5kg. This level of waist reduction is higher than that experienced by 'Measure Up' participants and a weight reduction of 3.6kg after 12 weeks should have yielded better results in terms of reduction of waist circumference.

6.2 Conclusion

'Measure Up' can be attributed differing degrees of success during and post intervention. The intervention stage provides results to show that participants reduce body weight between the start and completion of the intervention phase (P=0.001, Z=-4.267). The median reduction in weight of 3.6kg is approaching the rate recommended by NICE (2006) and is comparable to other studies.

NICE guidelines (2006) advise overweight or obese adults to aim for a body weight reduction of 5-10%. Of the participants that completed the intervention phase 79.4% decreased their body weight with 20.6% reducing their body weight by a clinically significant 5% or greater.

When considering the geographical area of Knowsley that 'Measure Up' is delivered in and the health inequalities experienced by residents of the borough this can be deemed a success and a step towards reducing the health inequalities experienced by Knowsley residents in comparison to England. The attrition rate of 16.4% during the intervention phase compare favourably with most studies.

There was not a change in waist circumference (P=0.547, F=0.615) that would be expected to accompany a steady weight loss, which has occurred from improvements to dietary intake and physical activity levels over a 12 week period. However, this is likely to be due to human error rather than a lack of reduction in central adiposity.

The attrition rates post course and lack of further weight loss (P=0.168, Z= -1.378) show that 'Measure Up' does not necessarily equip people to lose weight on their own once the programme finishes and they no longer have a weekly support session. Participants who had attended the weekly sessions were less likely to attend the follow up session and those that did maintained weight loss rather than losing further weight. In terms of measuring success of an intervention, one that supports participants to lose weight and maintain the weight loss could be considered effective. If those criteria are applied then 'Measure Up' would be deemed effective. However, a successful intervention would need to have lower attrition rates at 24 weeks than the 78.57% observed at 'Measure Up'.

The ‘Measure Up’ programme rather than the individual facilitator appear to be the influencing factor in supporting participants to lose weight as there was no significant difference in reduction of body weight (P=0.547, F=0.615) or percentage body weight reduction (P= 0.285, F=1.307) between the three sites that ‘Measure Up’ was delivered. Further studies would be required to determine if the results would be replicated across all areas of Knowsley and other areas of the country that have different characteristics to Knowsley.

6.3 Recommendations

Attrition rates and maintaining motivation are one of the barriers facing people delivering weight management interventions including 'Measure Up'. As 'Measure Up' is a weight management programme delivered by the NHS funded Community Health Development Team members of the local community with an eligible BMI of 25-35kg/m^2 can self-refer into the programme. They may acknowledge that they need to lose weight to improve their health but this does not necessarily mean that they are motivated to do so. Embarking on a weight management intervention when not motivated can have an adverse effect on the individual causing them to lose faith in the programme and their own ability to lose weight. If they leave the programme this can have an adverse effect on other participants who may not feel they should continue to put effort into their own weight management journey if others are not doing the same.

Recommendation 1. *Screen participants for motivation levels.*

The use of a motivation screening tool before people join the programme may reduce the numbers of unmotivated individuals joining the programme. A self-help

pack could be provided to the individual or appointment with the Health Trainer Service could be offered with the opportunity to participate when the individual is ready.

Recommendation 2*. Incorporate a technological aspect e.g. text messaging into the exit strategy.*

Participants may see the end of the intervention phase of 'Measure Up' as an abrupt end to their weight management journey and therefore not continue to implement the strategies learned in 'Measure Up'. A more effective exit strategy needs to be implemented to support participants to long term weight loss and weight maintenance.

Technology is increasingly being used as a tool to support people to lose weight. Simple interaction such as a participant replying to an email, text message or entering information into a smart phone app can provide the individual accountability that is lost when participants exit the group intervention.

Recommendation 3 *Implement training programme for all 'Measure Up' facilitators to improve accuracy of measurements.*

The results for change in waist circumference were not as expected. This is potentially related to human error and a lack of accuracy of measuring and recording anthropometric data.

`***Recommendation 4*** *Offer more flexibility for follow up appointment.*

Participants may have successfully attended the intervention sessions as they incorporated them into their weekly routine. This routine will change once the group sessions have finished and therefore participants may have found it difficult to attend the follow up appointment.

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Appendices

Appendix 1

Measure Up Protocol for Measuring Weight

- Place the SECA electronic class III scales on a hard flat surface.
- Adjust the scales so that the bubble is centred in the circle.
- Check that the scales read zero.
- The participant should wear light clothing and remove their shoes.
- The participant should stand unassisted.
- Ask the participant to look straight ahead, standing relaxed but still.
- The scales should be calibrated regularly throughout the year.

Appendix 2

Measure Up Protocol for Measuring Height

- Assemble the Leicester Height Measure according to the instructions.
- Participants should wear clothing that allows their posture to be observed.
- Shoes and socks should be removed.
- The participant should stand with the back and head straight so that the Frankfurt plane is horizontal and the eyes are focused forward.
- Feet, knees, buttocks and shoulder blades should be in contact with the vertical surface of the height stand.
- Arms should be hanging loosely at the sides with palms facing the thighs; the head is not necessarily in contact with the height stand.
- Participants are asked to take a deep breath and stand tall to aid in straightening of the spine. Shoulders should be relaxed.

- The moveable headboard should be gently lowered until it touches the crown of the head.

Appendix 3

Measure Up Protocol for Measuring Waist Measurement

- The participant should be wearing loose light clothing e.g. t-shirt
- The participant should stand up straight.
- The participant should be asked to hold the end of the tape measure over the t-shirt on their belly button.
- Ask the participant to pass the tape measure around their back.
- The tape measure should be taut but not tight and a measurement should be recorded.
- The participant should breathe in and out and a measurement should be recorded.

N.B the recommended site for a waist measurement is the mid point between the hip and lower rib bone. However as these measurements are being taken in a community setting it is important that people are comfortable with the method used to take measurements. The site of the belly button is used so that repeat measurements are accurate.

Appendix 4

Participant Consent Form

Title of Project: A study of the effects of a 12 week weight management programme on body weight, waist measurement and self esteem.

Name of Researcher: Susannah Green

Please initial box

1. I confirm that I have read and understand the information sheet dated ……for the above study and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason and without my care or legal rights being affected. ☐
3. I agree to take part in the above study. ☐

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of Person taking consent (if different from researcher)	Date	Signature
_____	_____	_____
Researcher	Date	Signature

1 for participant; 1 for researcher

Appendix 5

Participant Information Sheet

This is your copy to keep

Study Title

A study of the effects of a 12 week weight management programme on body weight, waist measurement and self esteem

Invitation

My name is Susannah Green and I would like you to consider taking part in my student research study. Before you make a decision it is important for you to understand why the research is being done and what it will involve. Please take your time to read the following information carefully and discuss it with others if you wish. If any part is unclear or if you would like more information, then please feel free to ask me. Please take your time to decide whether or not you wish to take part.

The purpose of the study

My aim is to conduct an evaluation of the Measure Up programme to determine whether it is effective in helping people to lose weight and maintain weight loss. I am carrying out this research study as part of a student project on a small scale and the results will be used towards obtaining my Masters degree in Weight Management

Why have I asked you to take part in the study?

I aim to use results from Measure Up courses running between April 09 and August 09. As you are taking part in Measure Up within this time period I would like to use your weight loss results as evidence.

Do I have to take part in the research study?

No. It is purely voluntary. If you do decide to take part you will be given this Participant Information Sheet to keep and will be asked to sign two copies of a consent form. Both you and I will keep a copy. You are free to withdraw at any time and you do not have to give a reason. A decision to withdraw at any

time, or a decision not to take part, will not affect the standard of care you receive.

How will the research study be run?
If you decide to take part, you will take part in Measure Up as normal but you will give permission for your weight change, waist measurement change and self esteem results to be used in the study. You will not be identified in the study all information will be coded

What do I have to do to take part?
Complete the Measure Up course as normal and attend a 3 month follow up appointment to assess weight maintenance.

I will provide you with a Participant Information Sheet and two copies of an Informed Consent Form will be provided for you to take home and also a stamped addressed envelope. The Informed Consent Form will confirm your acceptance to participate in the study. It will also protect your rights to withdraw from the study at any time.

If you would like to volunteer after reading the Participant Information Sheet, please confirm whether you wish to participate in the study by sending the two completed Informed Consent Forms in the stamped-addressed-envelope to myself (Susannah Green) within 5 days. When I have received your informed consent forms, I will countersign both forms and send one copy back to yourself, for your own reference.

The possible benefits of taking part
There are not likely to be any obvious benefits to you, although it will give us an opportunity to ensure that Knowsley residents are receiving the best possible weight management services.

What if something goes wrong in the research?
You have the right to withdraw from the research study at any time – see Informed Consent Form.

What if there is a problem?
If you have a concern about any aspect of this study, you can ask to speak to me and I will do my best to answer your questions. You can contact me on **0151 285 6013**. If you are unhappy with the response and wish to complain formally, you can contact the Head of Clinical Governance - **Irene Penney** at NHS Knowsley on **0151-443-4900**.

If I take part in this study, will my personal information be kept confidential?
Yes. All information collected about your participation in this study will be kept strictly confidential. Data will be saved onto a secure password protected computer and all personal information will be removed (e.g. your name) so that you cannot be identified in the research.

Your contact details will be held on a secure password-protected computer until the end of the research study, after which files will be securely destroyed.

What if I don't want to take part in the study?
You do not have to take part in the study to attend Measure Up. If you decide not to take part in the study the service provided on Measure Up will be the same as that given to people participating in the study. I will not use your data in the study without your permission.

Who is organising and funding the research?
I, Susannah Green, am organising the research as part of my Masters in Weight Management. My manager (Mrs L. Passey) of the Community Health Development Team in Knowsley is funding the research.

Contact for further information
If you want any more information on the research study, or have any queries, please do not hesitate to contact me at the Community Health Development Team on or by email:

If having read this Participant Information Sheet, you wish to take part in this study, **please complete two copies of the Informed Consent Forms and return in the stamped-addressed-envelope provided.** If you have misplaced the forms, you can contact me on the telephone number/email address above and I will send them to you by first class post.

Thank you for reading this information
Your participation will be greatly valued.

Susannah Green
Community Health Development Team
Ashgarth
Pilch Lane
Huyton
L14 0JE

Appendix 6

Recruitment to Measure Up

Pre Programme Advertising

'Measure Up' courses are advertised in the local area in which they are running. Flyers are distributed in local community venues such as schools, libraries, community centres, leisure centres, pubs, health centres, post office, local shops and pharmacies

Adverts are placed by in the local free newspapers e.g. Knowsley Challenge, Kirkby Extra, Knowsley News with a brief outline of 'Measure Up' along with venues and dates the course will be running. A message detailing the course overview, dates and venues are distributed using Community Messaging. Community Messaging is an initiative run by Knowsley Council whereby residents can register for updates about their local area. Updates include local events, crime rates, and local police warnings about bogus callers etc. Updates can be received as a voice message, text message or email.

Registering Course Interest

Prospective participants can be referred into 'Measure Up' by a partner agency e.g. mental health support workers, Children Centres Staff, Social Workers, Health Trainers, Dieticians, Practice Nurse, GPs etc. These referrals are contacted by Community Health Development Team and have a screening appointment booked.

Prospective participants who are self referring into 'Measure Up' contact the Community Health Development Team by phone and complete a referral form over the phone. They then book a screening appointment.

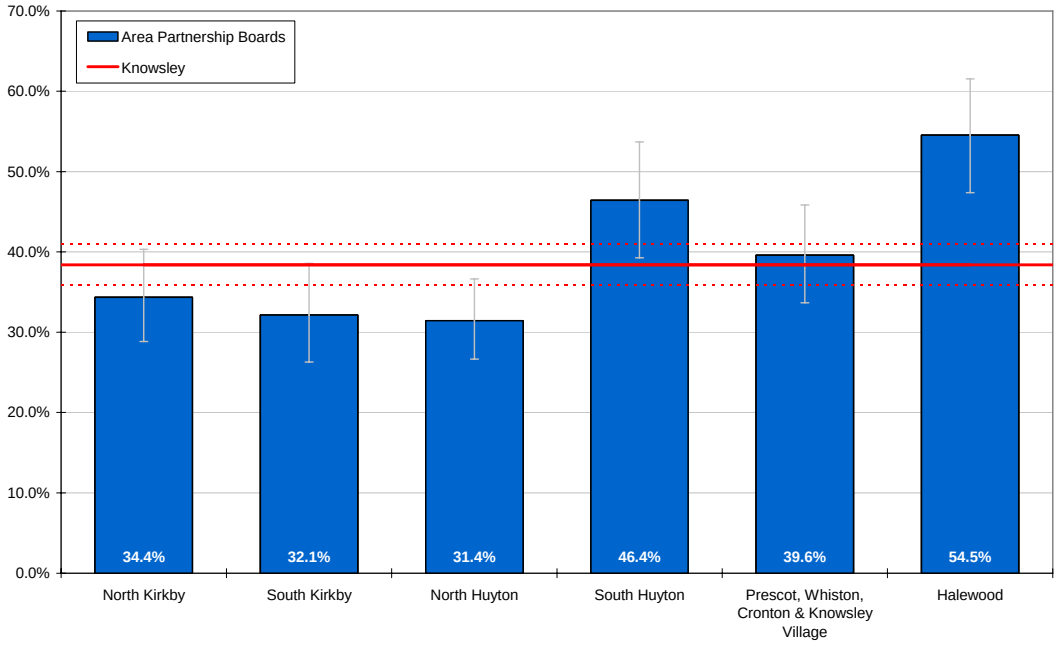
Pre Course Screening Appointments

'Measure Up' is part of the 'Knowsley Obesity Strategy' and as such has a inclusion criteria of BMI 25-35kg/m^2. To ensure that people are offered the most suitable intervention prospective participants are invited to a screening appointment at a local community venue i.e. health centre or community centre with a Community Health Development Officer. Prospective participants have their height and weight measured, BMI calculated and weight management options explained to them. Individuals who meet the criteria for 'Measure Up' and want to attend are booked a place on the most convenient course for them. Individuals whose BMI exceeds the 'Measure Up' range are referred, with their consent to the 'Changes' weight management programme. Individuals who do not wish to or are not eligible to attend 'Measure Up' or 'Changes' are offered an appointment with a Lifestyle Advisor from the Health Trainer Service.

Appendix 7

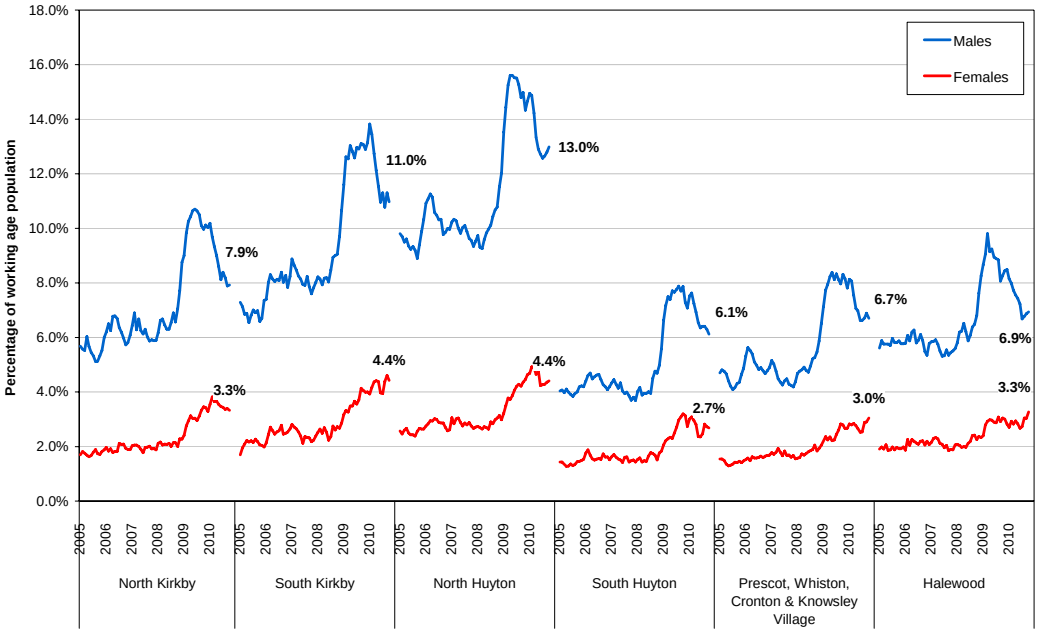
Wider Determinants of Health

Education Levels



Data Source: Knowsley Council; DCFS

Employment



Data Source: Knowsley Public Health Intelligence & Evidence Team & ONS/NOMIS

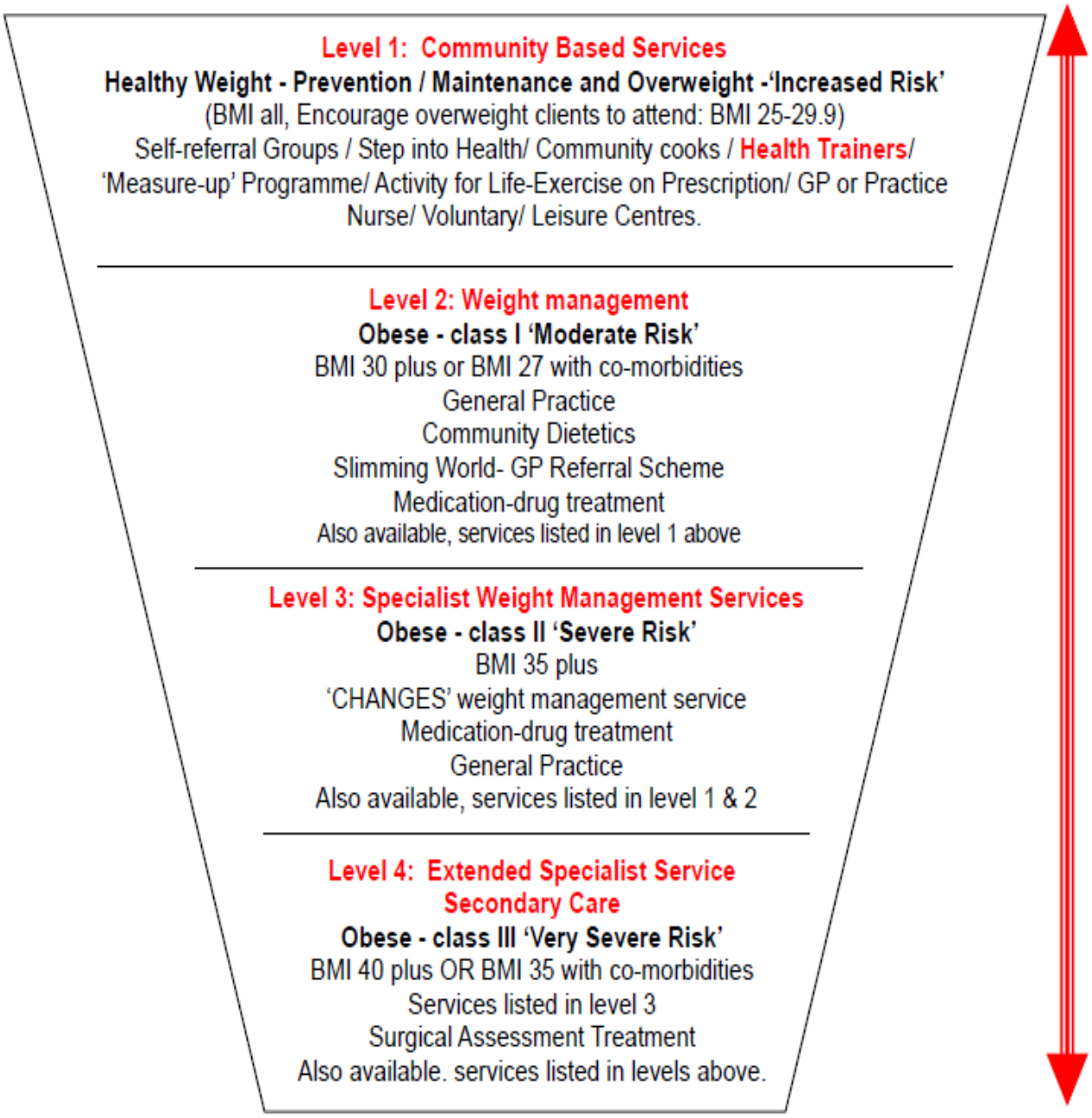
Deprivation

Domain		Kirkby Health		Knowsley South Health			
		North Kirkby	South Kirkby	North Huyton	South Huyton	PWCKV	Halewood
Overall ID	Score	38.77	46.11	50.36	24.89	30.05	32.37
	Rank	3	2	1	6	5	4
Income	Score	0.25	0.29	0.36	0.14	0.19	0.21
	Rank	3	2	1	6	5	4
Employment	Score	0.18	0.21	0.24	0.13	0.15	0.16
	Rank	3	2	1	6	5	4
Health & Disability	Score	1.37	1.56	1.65	0.87	1.05	1.06
	Rank	3	2	1	6	5	4
Education, Training & Skills	Score	42.34	44.98	48.05	21.62	26.39	29.93
	Rank	3	2	1	6	5	4
Barriers to Housing & Services	Score	18.13	14.68	11.44	13.84	14.93	19.17
	Rank	2	4	6	5	3	1
Crime	Score	0.39	0.72	0.8	0.46	0.43	0.32
	Rank	5	2	1	3	4	6
Living Environment	Score	21.64	42.25	34.89	19.77	21.93	23.98
	Rank	5	1	2	6	4	3

Data Source: Knowsley Public Health Intelligence & Evidence Team

Appendix 8

Knowsley Obesity Pathway



Appendix 9

Ethical Approval

NHS

National Research Ethics Service

Liverpool (Adult) Research Ethics Committee
Bishop Goss Complex
Victoria Building
Rose Place
Liverpool
L3 3AN

Telephone: 0151 330 2077
Facsimile: 0151 330 2075

01 June 2009

Susannah Green
Community Health Development Officer/Community Cooks Team Leader
NHS Knowsley
Community Health Development Team
Ashgarth, Pilch Lane
Huyton, Knowsley
L14 0JE

Dear Ms Green

Study Title:	**A study of the effects of a 12 week weight management programme on body weight, waist measurement and self esteem.**
REC reference number:	**09/H1005/27**
Protocol number:	1

Thank you for your letter of 18 May 2009, responding to the Committee's request for further information on the above research [and submitting revised documentation], subject to the conditions specified below.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation [as revised].

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

For NHS research sites only, management permission for research ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk. *Where the only involvement of the NHS organisation is as a Participant Identification Centre, management permission for research is not required but the R&D office should be notified of the study. Guidance should be sought from the R&D office where necessary*

Sponsors are not required to notify the Committee of approvals from host organisations.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	*Version*	*Date*
Covering Letter		18 May 2009
Response to Request for Further Information		18 May 2009
Referees' or other scientific critique report		05 March 2009
Participant Consent Form	1	05 March 2009
Participant Information Sheet	2	18 May 2009
Advertisement	1	05 March 2009
Questionnaire: Non-validated		05 March 2009
Questionnaire: Validated		05 March 2009
Statistician Comments		05 March 2009
Letter from Sponsor		05 March 2009
Summary/Synopsis	1	05 March 2009
Covering Letter		05 March 2009
Protocol	1	05 March 2009
Investigator CV		05 March 2009
Application	5.6	05 March 2009

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Service website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document *"After ethical review – guidance for researchers"* gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

09/H1005/27	**Please quote this number on all correspondence**

Yours sincerely

Professor Sobhan Vinjamuri
Chair

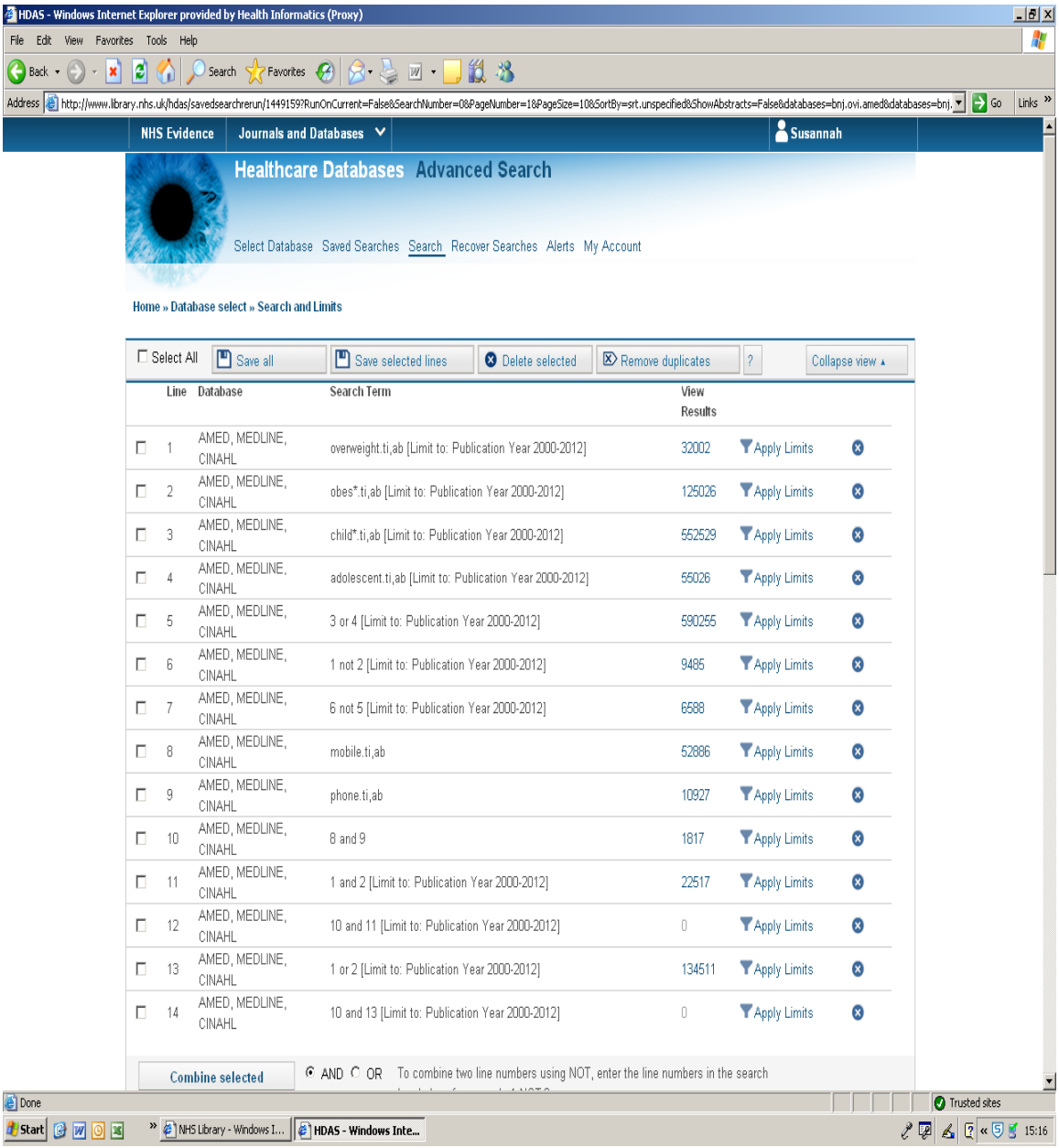
Email: Ronald.Wall@liverpoolpct.nhs.uk

Enclosures: "After ethical review – guidance for researchers"

E mail copy to: *Prof Kevin Sykes, University of Chester*
Dr Stephen Fallows, University of Chester

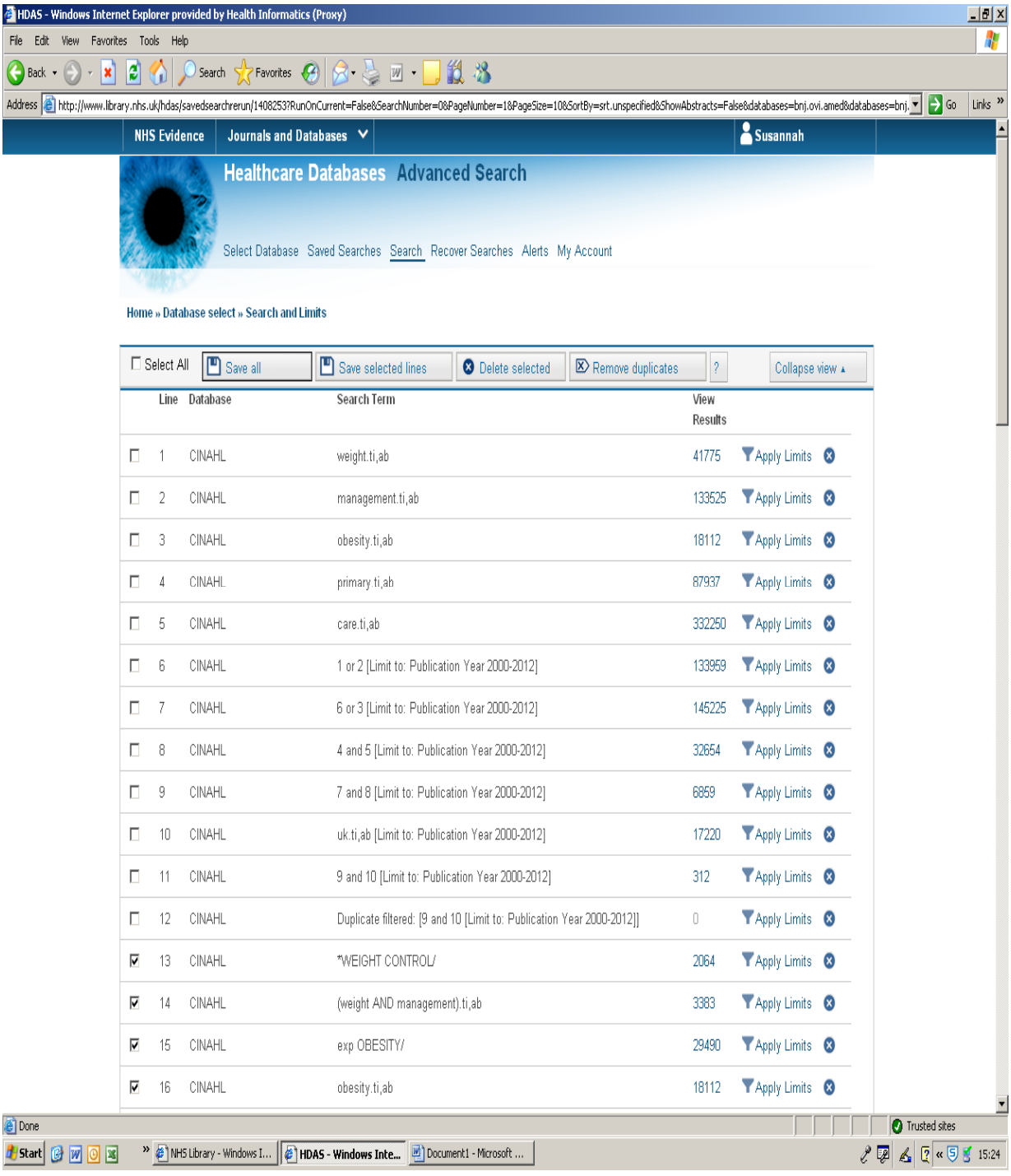
Appendix 10

Literature Search Weight Management Using Technology



Appendix 11

Literature Search Weight Management in Primary Care



Appendix 12

Literature Search Weight Management Using Internet

Appendix 13

Descriptive Statistics for Body Weight During 'Measure Up' Intervention Phase

Descriptives

			Statistic	Std. Error
week 6 weight	Mean		76.8167	3.70334
	95% Confidence Interval for Mean	Lower Bound	69.1557	
		Upper Bound	84.4776	
	5% Trimmed Mean		75.0620	
	Median		74.1500	
	Variance		329.154	
	Std. Deviation		18.14259	
	Minimum		49.60	
	Maximum		138.10	
	Range		88.50	
	Interquartile Range		14.90	
	Skewness		2.024	.472
	Kurtosis		5.636	.918
week 12 weight	Mean		75.7500	3.66304
	95% Confidence Interval for Mean	Lower Bound	68.1724	
		Upper Bound	83.3276	
	5% Trimmed Mean		73.9750	
	Median		73.2500	
	Variance		322.029	
	Std. Deviation		17.94516	
	Minimum		48.30	
	Maximum		137.80	
	Range		89.50	
	Interquartile Range		12.68	
	Skewness		2.102	.472
	Kurtosis		6.147	.918
Baseline Weight (kg)	Mean		77.8917	3.75632
	95% Confidence Interval for Mean	Lower Bound	70.1211	
		Upper Bound	85.6622	
	5% Trimmed Mean		76.1639	
	Median		75.1000	
	Variance		338.638	
	Std. Deviation		18.40212	
	Minimum		49.90	
	Maximum		139.30	
	Range		89.40	
	Interquartile Range		14.00	
	Skewness		1.942	.472
	Kurtosis		5.360	.918

Appendix 14

Statistical Analysis of Body Weight Through 'Measure Up'

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
week 6 weight	.235	24	.001	.800	24	.000
week 12 weight	.216	24	.005	.795	24	.000
Baseline Weight (kg)	.245	24	.001	.808	24	.000

a. Lilliefors Significance Correction

Friedman Test

Test Statistics[a]

N	24
Chi-Square	21.894
df	2
Asymp. Sig.	.000

a. Friedman Test

Post Hoc Test using Wilcoxon Signed Ranks

Test Statistics[b]

	week 6 weight - Baseline Weight (kg)	week 12 weight - Baseline Weight (kg)	week 12 weight - week 6 weight
Z	-3.699[a]	-4.267[a]	-3.271[a]
Asymp. Sig. (2-tailed)	.000	.000	.001

a. Based on positive ranks.

b. Wilcoxon Signed Ranks Test

Appendix 15

Statistical Analysis for Weight Post Intervention

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
week 12 weight	.364	7	.006	.667	7	.002
Baseline Weight (kg)	.379	7	.003	.641	7	.001
Follow Up Weight	.290	7	.076	.742	7	.010

a. Lilliefors Significance Correction

Test Statistics[b]

	week 12 weight - Baseline Weight (kg)	Follow Up Weight - Baseline Weight (kg)	Follow Up Weight - week 12 weight
Z	-4.267[a]	-2.380[a]	-1.378[a]
Asymp. Sig. (2-tailed)	.000	.017	.168

a. Based on positive ranks.

b. Wilcoxon Signed Ranks Test

Appendix 16

Statistical Analysis for Difference in Weight Change and Percentage Weight Change Between Venues

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	location1	Statistic	df	Sig.	Statistic	df	Sig.
Weight Change Baseline - wk12	Kirkby	.189	6	.200*	.913	6	.454
	Whiston	.246	6	.200*	.883	6	.282
	Knowsley Village	.176	11	.200*	.897	11	.172
Percentage Weight Change Baseline - wk12	Kirkby	.177	6	.200*	.938	6	.640
	Whiston	.245	6	.200*	.880	6	.269
	Knowsley Village	.191	11	.200*	.906	11	.221

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Weight Change Baseline - wk12	Based on Mean	1.046	2	20	.370
	Based on Median	.928	2	20	.412
	Based on Median and with adjusted df	.928	2	18.133	.413
	Based on trimmed mean	1.052	2	20	.368
Percentage Weight Change Baseline - wk12	Based on Mean	.690	2	20	.513
	Based on Median	.608	2	20	.554
	Based on Median and with adjusted df	.608	2	16.541	.556
	Based on trimmed mean	.691	2	20	.513

ANOVA

Weight Change Baseline - wk12

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.227	2	3.114	.708	.504
Within Groups	92.391	21	4.400		
Total	98.618	23			

ANOVA

Percentage Weight Change Baseline - wk12

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17.727	2	8.863	1.351	.282
Within Groups	131.178	20	6.559		
Total	148.905	22			

Appendix 17

Statistical Analysis for Change in Waist Circumference

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
week 12 Waist	.104	32	.200*	.977	32	.702
Baseline Waist (cm)	.140	32	.115	.969	32	.471

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Baseline Waist (cm) - week 12 Waist	-.68750	5.10179	.90188	-2.52689	1.15189	-.762	31	.452